

CANNABIS

A REPORT OF THE COMMISSION OF INQUIRY INTO THE NON-MEDICAL USE OF DRUGS

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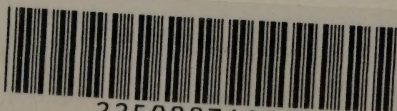
From:-

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22500074950

"hypersynchronous" neurophysiol.
chronic effects
auto-synchronization + disinhibition
man/mouse argument

W. D. M. Blom.

June '72



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A REPORT OF THE COMMISSION OF INQUIRY INTO THE NON-MEDICAL USE OF DRUGS

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CANADA

The Honourable John Munro, P.C., M.P.,
Minister of National Health and Welfare,
Brooke Claxton Building,
Tunney's Pasture,
Ottawa, Ontario.

Sir,

The Commission of Inquiry into the Non-Medical
Use of Drugs, established under Order-in-Council 1969-
1112, has the honor to submit to you a report entitled
Cannabis.

Respectfully yours,

Gerald Le Dain
GERALD LE DAIN, Chairman

Ian L. Campbell Heinz E. Lehmann
IAN L. CAMPBELL, Member HEINZ E. LEHMANN, Member

J. Peter Stein
J. PETER STEIN, Member

Marie Andrée Bertrand
MARIE-ANDRÉE BERTRAND,
Member

James J. Moore
JAMES J. MOORE,
Executive-Secretary

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Note to Reader

A list of notes containing supplementary textual material appears at the end of Chapters 2, 3, 4 and 6 of this report. Notes are indicated in each of these chapters by superior letters within brackets; for example: ^{[a],[b]}.

References documenting Chapters 2, 3 and 4 appear at the end of this report in the section entitled References and Selected Bibliographies (beginning on page 339). References to Chapter 5, The Law, which contain documentation as well as supplementary textual material, appear at the end of that chapter. References are indicated in these chapters by superior numbers; for example: ^{10,240}.

Chapter 1

Introduction

1. Introduction

This report, one of a series of final reports by the Commission, attempts to deal with the issues which bear on the social policy which should be adopted towards cannabis. It deals with the nature and effects of cannabis, its distribution, and its patterns and extent of use. It also examines the existing law with respect to cannabis. Finally, it reports the conclusions of the Commission on the issues and makes recommendations to the federal government concerning legislative policy.

To place this report in proper perspective it is necessary to recall the Commission's terms of reference. These are set forth in the Order-in-Council (P.C. 1969 - 1112), which established the Commission on May 29, 1969, as follows:

- (a) to marshal from available sources, both in Canada and abroad, data and information comprising the present fund of knowledge concerning the non-medical use of sedative, stimulant, tranquilizing, hallucinogenic and other psychotropic drugs or substances;
- (b) to report on the current state of medical knowledge respecting the effect of the drugs and substances referred to in (a);
- (c) to inquire into and report on the motivation underlying the non-medical use referred to in (a);
- (d) to inquire into and report on the social, economic, educational and philosophical factors relating to the use for non-medical purposes of the drugs and substances referred to in (a) and in particular, on the extent of the phenomenon, the social factors that have led to it, the age groups involved, and problems of communication; and
- (e) to inquire into and recommend with respect to the ways or means by which the Federal Government can act, alone or in its relations with Government at other levels, in the reduction of the dimensions of the problems involved in such use.

Clearly we are required to focus our inquiry not on cannabis alone, but on a very broad range of psychotropic substances. This we have done, and the results of our inquiry with respect to other drugs will be published in a subsequent final report. of other subject areas referred to in our Terms of Reference. We believe, however, that the issues surrounding the use of cannabis in Canada today warrant detailed examination in a separate report.

However, as we noted in our *Interim Report*, the use of a particular drug in our society cannot be examined realistically without reference to other forms of prevailing drug use. Accordingly, in this report we will make frequent reference to possible relationships between cannabis use and other forms of non-medical drug use. A more general and comprehensive discussion of multiple-drug use will appear in a later report.

We have not attempted in this report to examine in detail the question of motivation to use cannabis, although it is touched on to some extent in the

chapter on patterns of use. This requirement of our terms of reference will be met in a subsequent report in which this important aspect of our inquiry will be discussed and analysed more comprehensively than would have been possible within the context of cannabis use alone.

THE COMMISSION'S PUBLIC HEARINGS

At the outset of our work, we determined that if we were to adequately examine the phenomenon of non-medical drug use within the context of modern life in Canada, we would have to rely not only on the information and opinions of scientists and of experts, but also on the opinions, attitudes and experience of individuals in many parts of Canada. It was for this reason that we began our first round of public hearings in September 1969, and, following the publication of our *Interim Report*, we undertook a second round of public hearings. It was our objective in this latter round of hearings not only to increase our awareness of the views of the Canadian people, but also, wherever possible, to obtain from them their own sense of the value of the perceptions, conclusions and interim recommendations contained in the *Interim Report*.

In all, the Commission held public hearings for 46 days, travelling some 50,000 miles to 27 cities and 23 university campuses in all the provinces of Canada. A total of 365 submissions were presented to us at these hearings and an additional 50 were forwarded for our consideration to the Commission's office in Ottawa. We estimate that approximately 12,000 people in all segments of Canadian society attended and participated in these hearings. More than 500 Canadians also expressed their views to us through private correspondence. We believe that our awareness of the response of the public to non-medical drug use was much enhanced by these attempts to provide, through the public hearings, a forum for frank and informal exchanges of opinion.

As we said in our *Interim Report*, we were very impressed by the candor with which people of all ages came forward and spoke from a depth of conviction and feeling about the phenomenon of non-medical drug use and its relation to other aspects of social and cultural change today.

THE COMMISSION RESEARCH PROGRAM

Our inquiry, of course, extended far beyond the scope of public attitudes in Canada. While science cannot itself provide ultimate answers to complex social phenomena involving various economic, legal, philosophical and moral issues, it is an important and necessary instrument in any systematic search for explanation and understanding. For this reason, the Commission has invested heavily in the scientific evaluation of many facets of current cannabis use in Canada.

We have developed a library that currently contains some 2,600 published and unpublished papers dealing with various aspects of cannabis. This does not represent the total number of papers surveyed by the Commission, but primarily those which we felt necessary to acquire for extended study. We have had full access to the library and documentation facilities of the

Addiction Research Foundation of Ontario, to the Library of the Department of National Health and Welfare, to the National Library, and to the National Science Library. In addition, we have received considerable assistance from other libraries in Canada and abroad through inter-library loan and special subject searches. Examples of these are the U.S. National Institute of Mental Health Clearinghouse for Drug Abuse Information, the U.S. National Library of Medicine, and the Science Information Exchange of the Smithsonian Institution.

Chapter 2 of this report, entitled *Cannabis and Its Effects*, is the product of an intensive and comprehensive review of existing scientific literature, integrated with the results of the Commission's own research program. We have tried to encompass the relevant knowledge in the areas of cannabis botany and chemistry, as well as the physiological, psychological and behavioural ramifications of cannabis use. The Commission's Research Director, Dr. Ralph D. Miller, has had direct supervision over this aspect of our research program. He was assisted in this work, and at various stages in the preparation of our review, by Dr. Ralph W. Hansteen, Joan Brewster, Patricia Oestreicher, Marilyn Jarvis and other members of the research and consulting staff.

Drs. Miller and Hansteen were responsible for conducting the Commission's experimental program investigating various acute effects of cannabis on humans. This phase of our research, which was initiated in 1971, is described in the chapter of the report dealing with *Cannabis and Its Effects* and, in more detail, in Annex A of that chapter. This research was designed to fill significant gaps in existing knowledge on issues of particular social relevance.

We appreciate the co-operation of Dr. L.D. Reid of the University of Toronto Institute of Aerospace Studies in collaborating with the Commission staff in studying the effects of cannabis and alcohol on psychomotor function. We were fortunate in having available to us the laboratory facilities of Dr. Heinz E. Lehmann at the Douglas Hospital in Verdun, Quebec for experiments investigating the effects of synthetic tetrahydrocannabinol and marijuana. The Department of National Defence facilitated our program by providing a site for our studies of the effects of cannabis and alcohol on some automobile driving tasks. Other researchers who have contributed significantly to our experimental program include Cannie Adamec, Lawrence P. Lonero, Dr. Barry Jones of McMaster University, Dr. Leonard Theodore of York University, Dr. Stephen Link of McMaster University, and Dr. Ronald Siegal of the University of California.

In addition to an extensive review of the international literature on possible adverse reactions and other medical complications associated with cannabis use, we have further examined the Canadian experience in a variety of ways. Formal studies conducted include a national survey of psychiatric hospitals, a multi-faceted study of physicians practising in the Ottawa area, and an investigation of innovative services and street clinics (as well as some formal treatment facilities) across the country. Data obtained from these sources were supplemented with information from public and private hearings, formal briefs and written submissions to the Commission, and by regular

contact with certain key persons involved in the treatment of drug-related problems, both across Canada and abroad. Commission Research Assistants Joan Brewster and Barry Hemmings have made major contributions to these projects.

In examining the botanical aspects and cultivation of cannabis, we were greatly assisted by the work of Dr. Ernest Small of the Department of Agriculture. In addition, Lucille Barash provided a review of the history of hemp cultivation in Canada.

In order to determine some of the chemical characteristics of cannabis currently being used illicitly in Canada, the Commission initiated chemical studies of cannabis samples obtained from a variety of sources, including police seizures and contributions from private individuals. In addition, we surveyed all major analytic facilities in the country for cannabis information. Extensive chemical studies were also made of the various cannabis samples obtained from the Health Protection Branch of the Department of National Health and Welfare for use in Commission experimental projects. P. Oestreicher and R.D. Miller were assisted at various stages in this research by Dr. Michael Willinsky and Kevin Fehr of the University of Toronto, Harry Beckstead of the Health Protection Branch, and Dr. Joan Marshman and her staff at the Addiction Research Foundation.

We have relied to a significant degree on research in the social sciences to amplify our knowledge and understanding of cannabis use in Canada. As directed in our terms of reference, we sought to determine the extent and patterns of the use of this and other drugs. Much of our information comes from several national surveys initiated by the Commission. These data require further analysis for detailed presentation, which will be made in a subsequent report, but we refer to the essential conclusions from it concerning the extent of use in Chapter 4. The surveys were carried out, under contract to the Commission, by the Survey Research Centre of York University, under the direction of Sondra B. Phillips and the general supervision of Dr. Michael Lanphier. Our surveys in the Province of Quebec were carried out by le Centre de Sondage de l'Université de Montréal.

In order to adequately comprehend the patterns of cannabis use, and some of the legal and economic implications in Canada, we investigated in considerable detail the sources and distribution of cannabis at various levels in the society. Mel Green, the Commission's Senior Research Assistant, supervised the investigation of the sources and patterns of trafficking at both the international and domestic levels.

The Commission conducted a study of the social and personal characteristics of conventionally employed Canadians over the age of 27 who were users of cannabis. Further, in order to determine some of the dimensions of marijuana and hashish use in a natural setting, the Commission analysed the recorded activity and actual drug consumption patterns (over a period of a month) of a small group of cannabis users who were students or gainfully employed adults. We also studied the use of cannabis and other drugs by young people across the country using participant observation techniques. Mel Green had major responsibility for these studies.

We express our thanks to the many other staff scientists not previously noted who assisted us in our sociological research. We make special mention of Research Assistants Judith Blackwell, Burton Leathers, David McLachlen, Gordon Smith, and Research Associate Dr. Lynn McDonald of McMaster University.

Our examination and assessment of the existing law and law enforcement methods in Canada required a detailed empirical investigation of these aspects of social policy. This research was carried out under the direction of Professor John Hogarth of Osgoode Hall Law School, York University, assisted by Robert Solomon. Research into the doctrinal aspects of the law was conducted by Professor Paul Weiler, of Osgoode Hall Law School, and a comparative study of foreign drug legislation was carried out by Professor Stuart Ryan of the Queens University Law School. We are also grateful for the co-operation provided to us in this phase of our inquiry by the Royal Canadian Mounted Police, Statistics Canada, and the Bureau of Dangerous Drugs of the Department of National Health and Welfare.

Detailed technical reports presenting a comprehensive discussion of certain projects from the Commission research program will be published subsequent to this report.

CONSULTATION, ADVICE AND INFORMATION

The growing use of cannabis obviously is not confined to Canada. Its increasing prevalence in this country reflects a trend that has been observed in a number of other areas of the world. The observations, experiences and opinions of experts and other observers in numerous countries have been available to us. In some cases, members of the Commission and staff have gone abroad to seek the experiences of those conversant with the phenomenon in their own countries. We also sought their views and expertise in a number of private meetings and symposia held in Canada. Representatives of the Commission attended most of the major scientific conferences around the world dealing with cannabis during our mandate. We are grateful for the insights and knowledge so readily passed on to us, particularly in the fields of law and science.

We make special mention of the assistance provided to us by the Addiction Research Foundation of Ontario. The availability of data from their documentation centre and library greatly facilitated the work of the Commission research staff, as did the chemical analytic services provided. In addition, we are appreciative of the generous advice and consultation provided at various stages of our inquiry by members of the Foundation research staff. We are also grateful for the co-operation so readily given by Dr. A.B. Morrison and his colleagues in the Health Protection Branch of the Department of National Health and Welfare.

Finally, our thanks go out to the other members of the Commission's regular staff and consultants whose labour and dedication made possible the implementation of our research program and the publication of this report. C. Michael Bryan, the Commission's Special Assistant, co-ordinated the editing and publishing of the report. A list of the Commissioners and staff appears in Appendix B.

Chapter 2

Cannabis and Its Effects

2. *Cannabis* and Its Effects

INTRODUCTION^[a]

The Identity and History of Cannabis

Marijuana and hashish come from *Cannabis sativa* L.,^[b] an herbaceous annual plant often called “Indian Hemp”, which readily grows wild or is cultivated in most of the tropical and temperate areas of the world including Canada. Cannabis is one of man’s oldest cultivated non-food plants and is thought to have originated in Asia.⁵⁴⁶ Although many varieties with somewhat different physical and chemical characteristics are often distinguished, most botanists consider these to be members of a single species. Some confusion has been caused by the botanically incorrect use of the word *hemp* in referring to the commercial fibres obtained from a variety of other fibre-producing plants.^[c] In this report, *hemp* is taken to mean “true hemp” or *Cannabis sativa*. Cannabis is closely related to *Humulus*, the genus of the hop plant.

What is commonly referred to as *marijuana* (often called ‘grass’, ‘pot’, ‘weed(s)’, ‘bush’, ‘tea’, ‘reefer’, ‘boo’, ‘Mary Jane’ or the more general ‘dope’ or ‘shit’) in North America, is usually a mixture of crushed cannabis leaves, flowers, and often small twigs, and may vary considerably in potency from one sample to another. Similar preparations are known as *bhanga* (the more potent and carefully prepared flowering tops as *ganja*) in India, *kief* in Morocco, and *dagga* in southern Africa. In Jamaica, *ganja* may refer generally to marijuana. The plant produces a resin which, in relatively pure form, is called *hashish* (‘hash’) in the West and much of the Middle East, and *charas* in India. Hashish is usually prepared by shaking, pressing or scraping the amber resin from the plant, although solvent techniques might be used. In general, hashish is several times as potent on a weight basis as marijuana, although this is not always the case. The label *hashish* has sometimes been applied to special flower and leaf preparations of the plant, as well as to the resin, although this broad use of the term is now uncommon except in parts of Egypt. In addition to these common forms of cannabis, concentrated extract is available in some countries in an alcohol solution (tincture of cannabis) designed for medical or research purposes, and several of the cannabinoid compounds present in the natural plant material and related synthetics are available in relatively pure form for research. *Tetrahydrocannabinol* (THC), the principal active compound, is rarely, if ever, available on the ‘black market’. In this report, the general term *cannabis* will be taken to cover all the various forms of hemp drugs (marijuana, hashish, THC, etc.).

A brief glossary of some scientific and technical terms employed in this chapter appears at the end of this report.

There are several hypotheses regarding the etymology of the word *marijuana* or *marihuana*. Many believe it derives from the Mexican name for ‘Mary Jane’, or ‘Mary and Jane’ (*Maria y Juana*). Others have suggested that it is related to *mariguano* (a Mexican-Spanish word for ‘intoxicant’), or its linguistic relative *maranguango* (a Panamanian provincialism). Numerous other derivations of *marijuana* have also been proposed.^[d]

Centuries ago, the Arabic word *hashish* was generally equivalent to 'dry herb' or 'grass' and later, more specifically, 'hemp' and often 'cannabis resin'.^{312,459} It has often been said that the present English word *assassin* is developmentally linked with the word *hashish*. A variety of interesting and conflicting tales have been told of the legendary Hassan, "The Old Man of the Mountain" of 11th Century Persia, and his religious followers, called by some the "ashashin", and the possible role of cannabis and other drugs in connection with their religious, political and military endeavours. Both the validity of this linguistic derivation and the ultimate historical veracity and pharmacological significance of the legend are still matters of some dispute.^{9,10,22,116,368,392}

In many societies, *Cannabis sativa* has been a highly valued crop for reasons other than the plant's medical and non-medical pharmacological uses. The durable fibres of the woody trunk are used in the production of hemp rope and twine, and are woven into fine or rough cloth for such diverse products as blankets, clothes, flags and boat sails. The plant is one of the most efficient producers of cellulose pulp employed in paper production and is used in the manufacture of some paper money. The seeds are an abundant source of oil (similar to linseed oil) used in paint and soap. The seeds are also used as food for man, animals and, most commonly, for poultry and other birds. Seedlings and seed cake are used for fish bait in some countries. The plants have been grown to control soil drift and have been used as windbreak fence in Canada and many other countries.

It is often said that the first detailed description of cannabis appeared in a medical book prepared by the legendary Chinese Emperor, Shen Nung (Circa 2700 B.C.).⁶⁰⁰ This pharmacy treatise, attributed to the mythical Shen Nung, was actually written by early Han dynasty scholars only a few centuries B.C.²⁹⁰ Archaeological data suggest that the knowledge of the use of hemp for various purposes goes back at least 6,000 years. Evidence of cannabis has been discovered in an Egyptian site considered to be between three and four thousand years old, and the Scythians are reported to have grown hemp in the Volga region during the same period. Herodotus wrote of the Scythian practice of inhaling the fumes of burning cannabis as part of a funeral purification rite about 450 B.C.^{9,10,126,172,546} The earliest Indian Vedas, composed before 1400 B.C., refer to the pharmacological virtues of cannabis and the Sanscrit manuscript *Zend-Avesta*, written in Northern Iran about 600 B.C., mentions the inebriating properties of cannabis resin.^{36,70} The Hindu deity *Shiva* is the Lord of *bharg* among many other things, and *bharg* still plays an important symbolic and pharmacological role in the religious practices of many Hindus today. *Charas* (hashish), however, has not been traditionally involved in the worship.

Cannabis is said to have reached Spain approximately one thousand years ago, during the Moslem occupation, but Europeans appear to have had little acquaintance with the drug at that time.^{70,219} There was some importation into Europe during the seventeenth century,¹⁹⁰ but serious European investigation of the social, religious or medical uses of cannabis did not occur until after the entry of Napoleon's expeditionary force into Egypt in 1798.^{59,77,214,219} The use of cannabis in Western medicine was reinforced in 1843 by

O'Shaughnessy,⁴⁸² a British physician returning from India, and, in France, Moreau de Tours wrote extensively on the therapeutic uses and abuses of cannabis during the same period.^{315,454}

Some European adventurers had used the drug earlier as a consequence of their travels through the Arab world. But it was not until 1844, with the founding of the famed Club des Hachischins in Paris, that the use of cannabis gained an appreciative, if very small and temporary, European following. The members of this club (including such French authors as Balzac, Hugo, Baudelaire and Gautier) used cannabis out of artistic and intellectual curiosity, and their personal experiences with the drug, as recounted by Baudelaire and Gautier, outraged the French bourgeoisie of the mid-nineteenth century.^{215,432} The Club des Hachischins, however, must be viewed as an exceptional episode in the European history of cannabis, as marijuana and hashish have only very recently (following the popularization of American practices) been used to any significant extent in Western Europe.^{57,219}

Bloomquist states that the use of cannabis was already firmly established among the indigenous peoples of Central and South America by the time the Spanish Conquistadores arrived in the sixteenth century.⁵⁷ The Spaniards did, however, introduce the cultivation of cannabis for its hemp fibre to Chile about 1545,¹⁵³ and consumption of the drug is said to have gained currency in Brazil with the arrival of African slaves who were familiar with its use.⁶⁵¹

The cultivation of hemp was apparently introduced to North America by Louis Hébert, Champlain's apothecary, in 1606 in Nova Francia (Nova Scotia).²⁹ The pilgrims planted hemp soon after that in New England. First France and then England encouraged hemp cultivation in their New World colonies, both for domestic requirements such as clothing and cordage, and to provide sails and rigging for their ships. Cannabis fibre was needed by the major naval powers of the time to outfit their sailing fleets, and when British access to such supplies in the East Indies was restricted by their Dutch rivals in the late sixteenth century, the British were forced to develop other hemp sources. Consequently, King James I commanded the American colonists to produce hemp, and, by 1630, cannabis was a staple crop on the East Coast.⁵⁷ Later, the government of Virginia awarded bounties for hemp culture and manufacture, and imposed penalties on those who did not produce it.⁷⁵ Similar stern attempts to stimulate the industry occurred in Eastern Canada.²⁹ The wagons which carried the pioneers westward were covered with hempen fabric and approximately half of the clothing worn by the colonials during the seventeenth century and almost all of the clothing worn by the slaves until 1847 is said to have been made from this material.^{29,57,75,219,243,530}

Apparently the early colonists did not use hemp for its intoxicating effects. But there is some possibility that certain individuals, including George Washington (who cultivated cannabis on his Mount Vernon plantation), were aware of its medicinal properties.^{19,653} Some North American Indians, most notably Sitting Bull, incorporated cannabis into the smoking mixtures used in their peace pipes.^{353,467,639} It is also likely that African slaves brought with them some knowledge of the pharmacological properties of hemp.^{9,10}

During the nineteenth century, the non-medical use of cannabis as a psychotropic substance in North America was apparently quite limited. At approximately the same time as Baudelaire was recording his experiences with hashish in Paris, a few Americans were also experimenting with the drug.¹⁰ Bayard Taylor, a popular novelist and foreign diplomat, reported his adventures with hashish in Egypt and Damascus in 1855.^{59,168,599,651} F. H. Ludlow, a college junior in Poughkeepsie, New York, legally procured a sample of cannabis resin from his local pharmacist after having his curiosity aroused by the mention of hashish in *The Arabian Nights*. His experiments with the drug resulted in his publication of a monograph on the subject of cannabis in 1857.^{314,380} Around the same time, Dr. Horatio Wood recounted his personal use of hashish to the American Philosophical Society⁶⁷⁶ and cannabis was recommended as a therapeutic aphrodisiac in a marriage guide. In 1912, Dr. Victor Robinson published two articles in a professional medical review detailing the effects of hashish as experienced by both himself and friends.⁵²⁶ These accounts, however, do not reflect general drug use patterns at that time. Popular non-medical consumption of cannabis in North America is a 20th century phenomenon, although quasi-medical and medical use of a variety of cannabis preparations, including elixirs and medicines, occurred earlier. The history of the non-medical use of cannabis is discussed further in Chapter 4 of this report.

North American hemp farming became less profitable after the advent of steam power around 1770 (which reduced the need for sails and rope) and with the invention of the cotton gin in 1793 (which diminished the market for textiles produced from hempen fibre).^{57,219} The commercial value of cannabis consequently declined and cultivation was later abandoned in New England, although it was maintained in other areas of the United States, particularly in the Midwest.¹⁵³ The commercial cultivation of cannabis for both domestic and export purposes continued at a limited level in Canada until the early 1930s, when the stock market collapsed and the subsequent reduction in the demand for and value of hemp made further production uneconomical. In 1938 an amendment to *The Opium and Narcotic Drug Act* prohibited the cultivation of cannabis without special authorization, and hemp fibre used in Canada since then has been imported.

The severing of Far Eastern supply routes during the Second World War led to a temporary resurgence of United States hemp production. The plant strains grown were generally selected for high fibre content and low pharmacological activity. The reopening of foreign fibre sources and the introduction of synthetic substitutes at the conclusion of the war drastically curtailed domestic cultivation and there is currently no legal commercial production of hemp in North America. The major hemp-producing countries today (for example, Russia, Italy and Yugoslavia) consume most of their domestic stock and export very little. In many areas, hemp plants have escaped cultivation and now exist as weeds. Despite the lack of a legitimate commercial market, cannabis still grows untended throughout most of the United States and Southern Canada. It has recently been suggested that a modern hemp industry be encouraged in North America for ecological as well as economic reasons, since cultivated cannabis is several times more

efficient in producing pulp for paper on an annual acreage basis than is forest woodland.^{525,604}

The Cannabis Literature

In the past decade, the controversy surrounding cannabis in North America has reached epidemic proportions. Alleged authorities have taken diametrically opposed positions regarding the drug, not only on moral and social policy issues, but on the supposedly hard scientific facts as well. Although the current world literature on cannabis numbers over 2,000 technical publications, few of these papers meet modern standards of scientific investigation. The majority of the available reports are poorly documented and ambiguous, emotion-laden and sometimes incredibly biased, and can, in general, be relied upon for minimal verified information. Scientific expertise in the area of cannabis has been limited by the simple fact that until recently there has been little clearly established scientific information available, and preconceived notions have often dominated the interpretation of ambiguous data. The past confusion is exemplified by current legislation in many areas of the world, including Canada and parts of the United States, which classifies cannabis with the opiate narcotics for control purposes, even though these drugs are pharmacologically and socially quite different.

The retarded state of scientific knowledge of cannabis can be attributed to several factors. To begin with, until recently, governmental restrictions on the medical and scientific use of cannabis in North America have been so strict that the majority of would-be researchers have found it more attractive to work in other areas. Secondly, since the widespread and middle-class use of cannabis in North America is a relatively recent phenomenon, it has not, in the past, been considered a particularly high priority research area from a public health standpoint. In addition, until the last few years, there was little possibility of standardizing or comparing the cannabis substances being studied since the relevant aspects of cannabis chemistry were unknown. Consequently, there was little basis for comparing reports, and generalizations from one study to another were limited. Much of the contradictory evidence previously reported may well be a function of widely differing doses of active cannabinoids being studied under different conditions.

However, many of the older reports are not without value. Interestingly, in many areas, recent formally designed studies have done little more than confirm the observations of a few carefully documented, but perhaps technologically limited investigations of the past.

The observations collected during centuries of relatively unrestricted cannabis use in regions of the East have rarely been scientifically documented, partly because most of what we consider modern science has been, until recently, a Western phenomenon. In addition, many of these countries have had considerably more pressing public health problems demanding the devotion of limited scientific and medical resources. Although profound cultural, moral and legal differences complicate the problem of generalizing

from reports of Eastern usage to the current North American scene, careful consideration of this literature is warranted.

In spite of strong disagreement among extremists on many points in the cannabis controversy, major governmental and international reports by independent groups of various backgrounds, and covering three-quarters of a century, have come to some surprisingly similar conclusions regarding the use and effects of cannabis. However, the effects of these reports on government policy have generally been limited. Major reports include the British *Indian Hemp Drugs Commission Report (1893-4)*,²⁹⁵ Mayor La Guardia's report on *The Marihuana Problem in The City of New York (1944)*,⁴⁰⁷ the South African *Dagga Report (1952)*,⁶²⁷ the United States President's Commission on Law Enforcement and Administration of Justice *Task Force Report: Narcotics and Drug Abuse (1967)*,⁶³³ the British Advisory Committee on Drug Dependence *Cannabis (1968)*, a report prepared under the chairmanship of the Baroness Wootton of Abinger,²³⁵ our own *Interim Report of the Commission of Inquiry Into the Non-Medical Use of Drugs (1970)*,¹⁰⁶ the Swedish Government's official investigations on *The Narcotic Problem: Part III, Coordinated Measures (1969)*,⁵⁹³ the *First Report of the Board of Health Committee on Drug Dependency and Drug Abuse in New Zealand (1970)*,⁴⁷³ the United States Department of Health, Education, and Welfare report *Marihuana and Health (1971)*,⁶³¹ the Australian *Drug Trafficking and Drug Abuse report (1971)*,²⁴ and the World Health Organization technical report on *The Use of Cannabis (1971)*.⁶⁷⁸ A major U.S. Commission of inquiry is currently being conducted, as well, and a report on cannabis is expected in 1972. In addition, in the past two years, a number of other significant cannabis reviews and bibliographies relevant to the present discussion of cannabis and its effects have been published.^[e]

The Pharmacological Classification of Cannabis

The pharmacological classification of cannabis is still the subject of much controversy. At a recent conference,²⁷⁸ Hollister voiced the opinion that "attempts to force it [cannabis] into some pharmacological cubby-hole are doomed to failure." Similarly, at the same meeting, Domino argued that cannabis has "...only superficial relationships with other drugs".¹⁵⁵ Cannabis has been compared to, and apparently has characteristics in common with a wide variety of drugs including alcohol, LSD and mescaline, nitrous oxide, amphetamines, atropine, opiate narcotics, barbiturates and the minor and major tranquilizers. Under various conditions and doses cannabis has been shown to have stimulant, sedative, analgesic and psychedelic effects. Some argue that marijuana should be classified as a sedative-hypnotic-general anesthetic like alcohol and nitrous oxide; others feel that it is a mixed stimulant-depressant; still others describe it as a mild hallucinogen—especially at higher doses; many feel it should be listed in a separate category.^{155,196,243,253,491,575,578,658} Paradoxically, cannabis has been shown to potentiate both the stimulant effects of amphetamines and the sedative effects of barbiturates in animals.⁶¹⁶ Legally, cannabis has traditionally been classified with the opiate narcotics, and while they may share some

euphorogenic and analgesic properties, they are otherwise quite distinct pharmacologically.

Cannabis, as it is most commonly used in North America, in low doses somewhat resembles alcohol in its subjective effects. Larger doses are more 'psychedelic', and with very high doses, persons have reported 'acid' (LSD)-like experiences. Hollister, as quoted by Smith,⁵⁷⁵ has suggested that marijuana lies halfway between alcohol and the hallucinogens, combining "the best of both worlds". The 1971 United States report *Marijuana and Health*⁶³¹ discusses in some detail the similarities and differences between cannabis and other drugs. In the context of its social use, marijuana is considered to be more like alcohol than LSD. The report concludes: "Pharmacologically speaking, cannabis is unique and distinct from the psychotomimetics, opiates, barbiturates and amphetamines." It is clear that any attempt to completely specify a pharmacological classification for cannabis must include a clear delineation of dose, as well as the set and setting of use. The Commission has, for the purposes of this report, classified cannabis with the psychedelic-hallucinogenic compounds.

CHEMICAL AND BOTANICAL ASPECTS

The General Chemistry and Botany of Cannabis

In the early 1940s, the psychotropic fraction of cannabis resin was isolated, and scientists came close to identifying the principal active compounds,^{6,614} but few subsequent advances were made until the 1960s. In the past ten years, considerable progress has occurred: the major natural cannabinoids have been isolated, their structures elucidated, and, in many instances, procedures for their synthetic production have been developed.^{420,421} The term *cannabinoid* refers to a class of Carbon 21 compounds typical of and present in *Cannabis sativa*, including a number of their carboxylic acids, analogues, and other transformation products.⁴²¹ Similar synthetic compounds, although not present in cannabis, may also be termed *cannabinoids*. The cannabinoids are also often collectively referred to as *cannabinols*, but since the term *cannabinol* is also applied to a specific compound, the less ambiguous label *cannabinoid* is preferred. The major cannabinoids of interest are *tetrahydrocannabinol* (THC), *cannabidiol* (CBD), and *cannabinol* (CBN), and their corresponding carboxylic acids (see Figure 1), although a large number of other minor related compounds have been identified.^{225,341,420,421,429,642}

A variety of technical labels has been suggested for THC and related compounds, leading to a rather confusing scientific controversy over nomenclature.^{309,421,555,595} The most prevalent and pharmacologically important isomer of tetrahydrocannabinol is often referred to as either 1- Δ^6 -*trans*-tetrahydrocannabinol (Δ^9 THC) or 1- Δ^1 -*trans*-tetrahydrocannabinol (Δ^1 THC) while a secondary isomer (present in fewer instances, and then generally in relatively minute quantities) is called 1- Δ^8 -*trans*-tetrahydrocannabinol (Δ^8 THC) or 1- $\Delta^{1(6)}$ -*trans*-tetrahydrocannabinol ($\Delta^{1(6)}$ THC or just Δ^6 THC), depending upon the nomenclature system preferred (one is based on the formal *pyran* numbering scheme and the other on the

FIGURE 1
THE STRUCTURES OF DOMINANT CANNABINOIDS

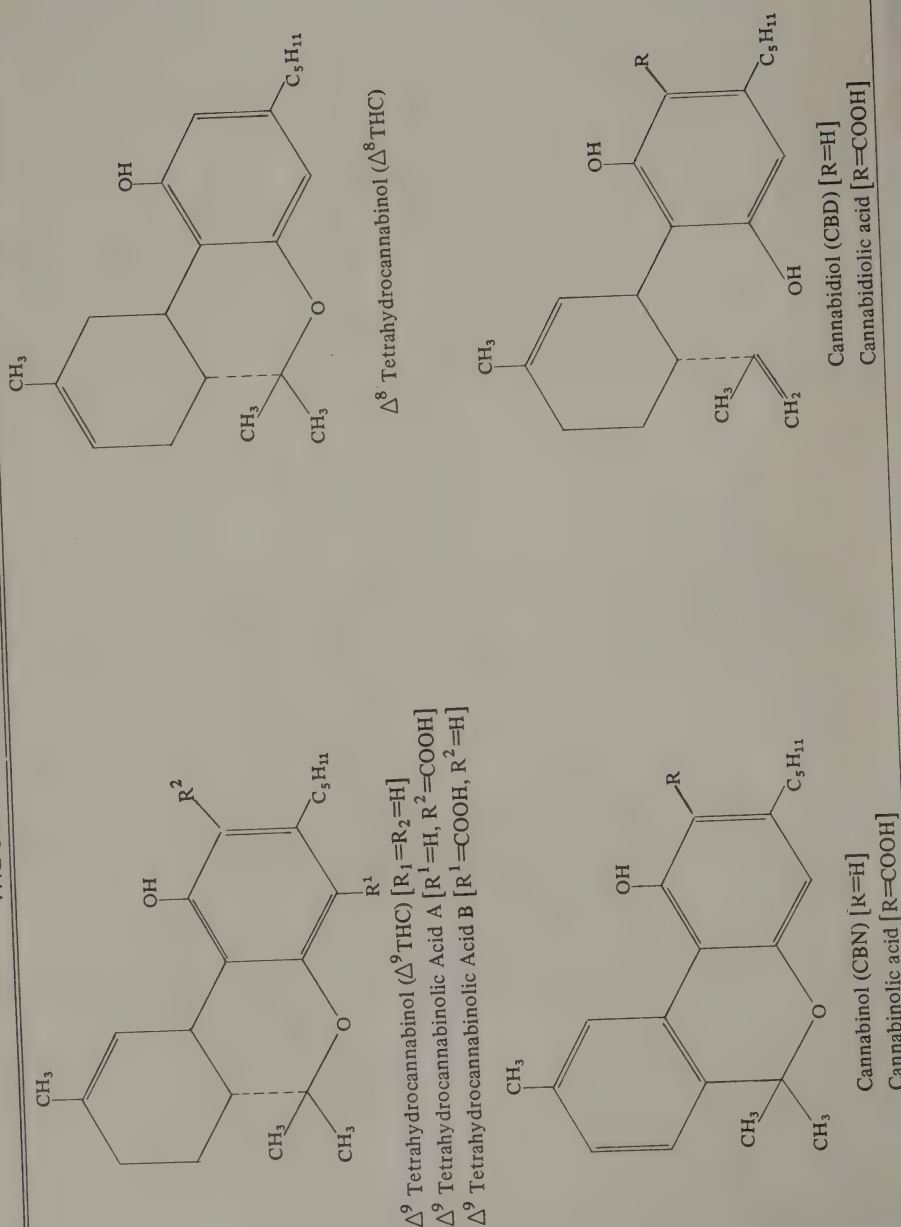


FIGURE 2
NUMBERING SYSTEMS FOR THE TETRAHYDROCANNABINOLS

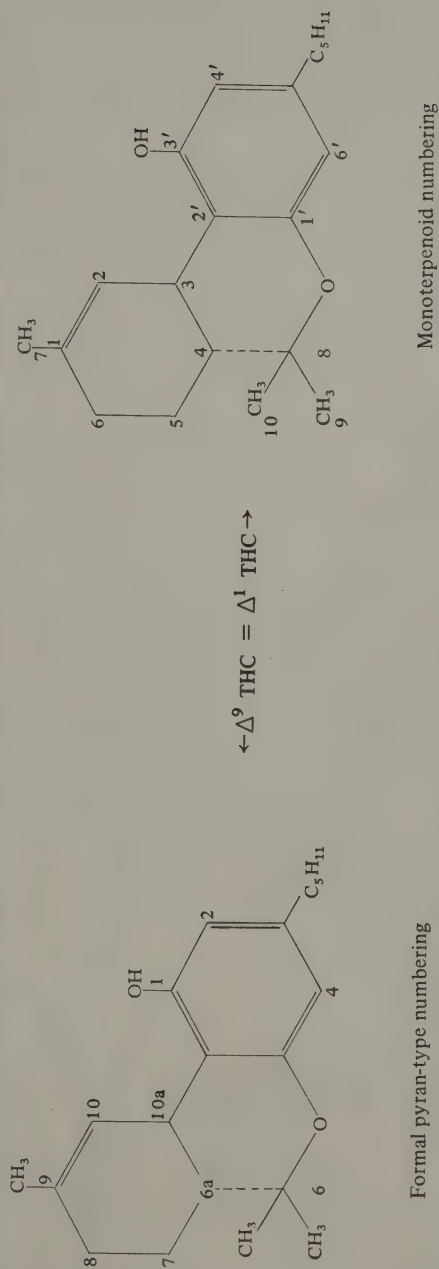


FIGURE 3

CANNABIS SATIVA L.



From "Marihuana" by Lester Grinspoon. Copyright © 1969, by Scientific American, Inc. All rights reserved.

monoterpenoid system). Although the latter approach is in some respects more consistent, the pyran system has recently gained dominance in the English literature, and will be employed here. (An example of the two different systems is presented in Figure 2.) A serious effort should be made, on an international basis, to develop a uniform cannabis nomenclature system.^[5] In this report, the two major forms of THC are referred to as Δ^9 and Δ^8 when this level of specification is necessary; otherwise the general label THC will be more routinely employed.

Numerous cannabinoids have been considered potential candidates in the search for the active principles of cannabis, but it appears that certain forms of THC are the primary psychoactive constituents. Commission research^{440,478} supports earlier evidence that a single isomer of THC (that is, Δ^9 THC) is generally responsible for the major psychological, behavioural and physiological effects of marijuana in man.^{298,424} Although it would appear that cannabinal (CBN) and cannabidiol (CBD) have little direct behavioural effect, evidence is not entirely consistent^{128,298,372,424,662} and thorough quantitative studies of these cannabinoids, or Δ^8 THC, have not been conducted in humans. Propyl and methyl homologues of THC and other cannabinoids have been identified in some cannabis samples.^{222,429,642} Very limited concentrations of non-cannabinoid compounds with some biological activity have recently been reported,^{49,224,341} but their general contribution to the overall cannabis effects have yet to be demonstrated and would seem to be negligible.^[6] The pharmacological role of Δ^9 THC will be discussed in more detail in a later section. In addition to the natural cannabis materials, during the past three decades considerable research has been done with synthetic cannabinoids (for example, DMHP, and Synhexyl or Pyrahexyl).

Since many basic questions of cannabis chemistry have only recently been resolved, serious difficulties exist in interpreting quantitative studies of cannabis carried out prior to 1971. Earlier techniques for extraction, identification, and quantitative analysis of cannabinoids in marijuana and hashish are of questionable validity and, in many instances, are grossly inadequate. Even in 1971, considerable analytic variability existed among different chemistry laboratories. The Commission has found discrepancies of several hundred per cent in quantitative Δ^9 THC analyses (and even greater differences in estimates of other cannabinoids) obtained with standard cannabis samples submitted to reputable, authorized laboratories in Canada and the United States. Similar inconsistencies, both within and between laboratories, have been noted by others.^{79,98} Our informal survey of major analytic facilities in North America revealed a consensus of opinion that most of the quantitative cannabis chemistry work to date is probably not adequate, and resulting estimates of cannabinoid quantities may contain errors of considerable proportions. This would indicate that many recent pharmacological studies of cannabis, which have attempted to specify THC dosage, may not be relied upon for specific quantitative information.

The Food and Drug Directorate [now the Health Protection Branch] of the Department of National Health and Welfare (DNHW) and, separately, the United States National Institute of Mental Health (NIMH) have initiated programs designed to develop and communicate standard analytic

techniques. The success of the programs has not been formally ascertained and no new studies of interlaboratory reliability have yet been reported. Such follow-up research, on an international scale, should clearly be given high priority.

While much is known regarding the agricultural aspects of hemp fibre production, until recently, little systematic botanical work using modern scientific techniques had been conducted into the pharmacological aspects of the plant.⁵⁶⁷ Two major botanical projects are now underway in North America and are contributing greatly towards bridging the information gap. A joint Department of Agriculture-Department of Health and Welfare project is in progress in Ottawa,⁵⁶⁸ and in the United States the NIMH is sponsoring a botanical program at the University of Mississippi.⁶²²

Depending on hereditary constitution and on the environment in which they are grown, tremendous differences in cannabis plants have been observed in such characteristics as height (less than one to more than thirty feet) and maturation time (less than two to more than ten months). Various plants differ considerably in other physical and chemical characteristics, as well.^{159,568} Cannabis usually has separate male and female plants, although hermaphroditic (*monoecious*) forms producing flowers of both sexes occur. The two sexes are generally indistinguishable until flowering begins. The males flower first, producing long feathery stalks, and die soon after their pollen is released into the air. The plants are wind pollinated, although bees are attracted to the male flowers. The fertilized female flowers produce ovoid fruits or seeds (2-3 mm in length) surrounded by bracts of small tightly packed leaves. No seed is produced if the flower is not fertilized. Female plants growing outdoors generally continue to live until killed by inclement weather (frost in northern latitudes, drought in many southern climates) but can be kept alive indoors for years.^{159,567}

Cannabinoids are primarily produced on the skin of the plant by small glands which are most plentiful on the flowers, the bracts which cover the fruit in the female, and the smaller leaves. Larger leaves and the skin of the stalk may contain lesser, though still substantial, quantities. In addition, cannabinoids are produced internally in minute amounts in other parts of the plant, and even stems, and seeds may contain small quantities of active materials.^{174,567} When grown under suitable conditions, almost all parts of both male and female forms of certain strains contain cannabinoids. The flowering tops are generally most highly valued for their pharmacological properties and are often harvested and treated separately in the preparation of the more potent forms of cannabis.

In fresh green plants, the cannabinoids are primarily present in carboxylic acid forms, which are changed into the corresponding neutral compounds by aging or heat (for example, burning or cooking).^{159,174} THC acid (THCA) for example, is apparently psychotropically inactive, and must be decarboxylated to THC prior to administration in order to produce significant effects. It has been suggested that some decarboxylation occurs in living plants growing in the tropics.⁴²⁰ Hashish, perhaps because of its age or conditions of treatment, generally contains a smaller proportion of cannabinoids in acid form. It would appear that CBD may be a precursor compound to the psychoactive

THC. CBN is not normally found in living plant material and its presence in marijuana and hashish generally represents post-harvest cannabinoid transformation. CBN content of cannabis materials might be used as a rough index of age, although other harvest and storage conditions are also likely to affect CBN concentration, and other degradation products of THC may also occur.

Environmental and genetic variables have only recently begun to be systematically explored with modern techniques. It appears that soil, temperature, water and light factors, as well as the length of the growing season, may affect the potency of cannabis.^{567,568,622} However, current evidence suggests that in many situations hereditary factors dominate and that potent, high-THC plants can be grown under most temperate conditions if the seed stock is suitable.^{159,568} It is often said that psychotropic cannabis cannot be grown in Canada, but this has been shown to be untrue. Quantitative analyses done for the Commission⁴⁷⁸ of Canadian grown marijuana revealed that while 'wild' hemp may contain only traces of THC, many of the illicitly cultivated plants tested were of reasonable potency. (See Table 2 below.) Samples from four police seizures, totalling over 20 plants, averaged 0.74% THC after more than 18 months of shelf storage. Other 'home grown' samples obtained and verified by the Commission ranged from 0.02% to 3.5% THC, with a median of 0.56%. The highest value was obtained from a plant grown indoors. High potency marijuana illicitly grown indoors with conventional tungsten lighting has also been reported in the United States.¹⁵⁹ The THC content in several hundred strains of cannabis grown at the Experimental Farm in Ottawa in 1971 ranged from near zero to close to 3%, and an average of 1,800 pounds of "manicured" marijuana (stems and larger seeds removed) were produced per acre.^{568,[g]} Using a 3% THC strain, an acre would be sufficient to produce the THC equivalent of well over six million 'average joints'.

Several investigators have noted the existence of two *chemical phenotypes*—strains in which the cannabinoids are composed primarily of CBD (referred to as the 'fibre' type since many fibre strains were found to have this characteristic), and strains in which the cannabinoids are composed primarily of THC (referred to as the 'drug' type because of the resulting psychoactive potential). The recent study carried out in Ottawa by Small and associates examined natural variation of cannabinoids in over 300 strains and verified the existence of these polar types.⁵⁶⁸ However, a complete spectrum of intermediate types was also found. Generally, "wild" plants, and material originating from countries north of latitude 30° N contained cannabinoids composed primarily of CBD. In contrast, material originating south of latitude 30° N possessed appreciably higher amounts of THC. However, seeds from strains grown for fibre south of latitude 30° N frequently produced plants in Ottawa which contained intermediate concentrations of THC.

The relative potency of male and female plants has been debated for a very long time. Until recently, there was widespread belief that male plants were psychotropically inactive. This belief may have resulted from the frequently noted procedure in India and other Eastern countries of removing male plants from the field before pollination occurs.^{70,295,451} This practice was

apparently intended to increase the potency of the female plant, although it has not yet been scientifically documented that unfertilized female plants will become more potent. Although male plants generally weigh less than female plants, several recent studies found that males and females produced equally potent marijuana, and a new consensus began to develop, holding that the sexes were equally potent.^{143,159,174,480} However, the recent study in Ottawa⁵⁶⁸ uncovered three distinctive common patterns. In high-CBD strains, at maturity, females almost invariably contained a much greater amount of cannabinoids and although very little THC was present, it always occurred in higher trace amounts in females than in the males. More pertinently, in approximately $\frac{2}{3}$ of the 40 or so high-THC strains examined, males and females were indeed equally potent. However, in about $\frac{1}{3}$ of these high-THC strains, the males were notably inferior, indicating that hereditary background strongly influences the relative potency of males and females. In addition to this genetic factor, a further consideration, harvest date, appears to be very important in determining the relative potency of male and female plants. Turner recently noted that in Mississippi, in both males and females, THC content rises to a maximum in the early flowering stage, and then tends to decrease. Because males flower relatively early, their THC content reaches a peak sooner, but with further maturation potency will appear relatively greater in the females.⁶²²

In both the illicit and authorized Canadian plants discussed above, CBN and Δ^8 THC were present in only minute amounts, while a considerable range of Δ^9 THC and CBD values occurred. Similar results have been obtained from marijuana grown in Mississippi¹⁵⁹ and England.¹⁷⁴ The fact that relatively high CBD values are found in many wild or cultivated 'non-drug' strains (see also Table 2 below) is of considerable potential social importance, since simple techniques have been developed in the laboratory for the conversion of such 'inactive hemp' to high potency psychotropic material.⁴²²

Considerable controversy exists regarding the stability, degradation, and shelf life of cannabis preparations. It is clear that isolated or synthetic pure Δ^9 THC oxidizes to inactive forms (including CBN) relatively rapidly when exposed to air, and that the rate of this transformation increases with the temperature.^{363,486} CBD, CBN and Δ^8 THC seem to be more stable. THC in intact plant material may be naturally protected and considerably more resistant to change than when in isolated or hashish forms. Some investigators have recorded little shift in THC content in dry marijuana stored under simple shelf conditions for periods of months or years, while others report a significant deterioration in potency over similar intervals.^{98,280,363,485,615,621} Some researchers store cannabinoids in the dark, frozen under nitrogen or in a partial vacuum to minimize degradation or change in the sample.⁶²⁰ Under certain conditions, there might even be an increase in cannabis potency with the passage of time.⁶⁴⁴ Delta-8 THC is considerably more stable, and easier to prepare in pure form than Δ^9 and, consequently, it has been frequently employed in animal research in the past two years, in spite of its limited occurrence in the plant.

Most of the data in the area of cannabinoid stability are complicated by the

analytic chemistry problems discussed previously, and properly controlled studies of storage variables have only recently been initiated.⁶²² Many questions regarding the effects of light, temperature, humidity, oxygen, plant enzymes, etc., on the stability of cannabinoids in storage remain to be clarified, but a sufficient number of investigators have observed little loss in potency over periods of over a year to suggest that adequate storage of dry marijuana need not be a difficult matter.^{43,78,304,556} Adequate standard storage procedures should be developed in the near future.

Illicit 'Street' Cannabis

It is often said that one of the major difficulties in scientific investigation arising from the present illicit use of cannabis is the lack of potency and quality control of materials available on the 'black market'. It is clear that in order for controlled laboratory research on a drug to have practical relevance to the social situation of ultimate interest, it is necessary to acquire an adequate picture of the present (and likely future) patterns of use, and accurate information regarding the identity, purity and potency of the drugs being consumed from illicit sources. Furthermore, detailed knowledge of the chemical characteristics of the drugs actually being used is necessary for public health purposes.

In both Canada and the United States, one frequently hears stories of alleged cannabis samples which were actually inert non-cannabinoid substances, or worse, were contaminated or adulterated with other more dangerous drugs or toxic chemicals. There have been rumours from the United States of toxic fungus on marijuana and of residual toxic compounds from indiscriminate use of pesticides by illicit cannabis farmers. United States federal agencies have been involved in and have encouraged the use of several highly toxic "defoliant" herbicide sprays for destroying or retarding illicit and wild marijuana growth in the United States.^{11,109,501} Some of these chemicals have been linked with birth deformities in both humans (Vietnamese) and animals, and their employment has been the cause of considerable alarm.⁶³² The use of one of these herbicides (2,4,5-T) has been discontinued for uses around the home and on lakes, ponds and ditch banks as well as in defense operations, including Vietnam. These restrictions, however, have not applied to the use of this chemical for weed control (such as marijuana) on non-agricultural land. It has not been determined whether any marijuana treated with these sprays has entered the 'black market'. None has been detected in Canada, but few appropriate tests have been conducted.

To date, chemical analyses of illicit cannabis samples suggest that 'bad dope' is the exception, rather than the rule. Although inert plant materials (for example, alfalfa, oregano, parsley, grass, etc.) are sometimes sold as marijuana, or used to 'cut' or dilute it for more profitable sale, and the odd beef boullion cube or brown sugar sample is represented as hashish, it would appear that in Canada, cannabis is rarely adulterated with other drugs. Pure THC has never been found on the 'street' in Canada and, with one possible exception,⁴⁹⁷ has never been documented on the 'black market' anywhere else in the world.

The Commission has initiated several chemical studies of illicit cannabis.⁴⁷⁸

TABLE 1
QUALITATIVE ANALYSES OF ILLICIT CANNABIS SAMPLES IN CANADA

Source	Alleged Identity	Date Analyzed	Number Analyzed	Number Pure Cannabis	Remainder
1) Commission Samples (j)(k)					
A. Street samples (Ont., Que., B.C.)	Marijuana	1970-71	21	21 (100%)	
	Hashish	1970-71	31	30 (97%)	1 - no drug
B. Selected police seizure samples (National)	Marijuana	Aug. 1971 &	88	84 (95%)	4 - no drug
	Hashish	Dec. 1971	71	64 (90%)	7 - no drug
2) Samples From Other Sources (Addiction Research Foundation, Toronto, Ontario, St. Boniface Hospital, St. Boniface, Manitoba, Lakeshore Psychiatric Hospital, Toronto, Ontario)	Marijuana	Apr. - Dec. 1971	29	20 (67%)	6 - no drug 1 - marijuana + PCP 1 - plant with atropine-like alkaloids 1 - marijuana + LSD
	Hashish	Apr. - Nov. 1971	19	11 (57%)	3 - no drug 1 - hashish + tobacco 1 - plant with atropine-like alkaloids 2 - opium 1 - A.S.A.
Total Marijuana			138	125 (91%)	10 - no drug 2 - marijuana + other drug 1 - other drug
Total Hashish			121	105 (87%)	11 - no drug 1 - hashish + other drug 4 - other drug
Total Cannabis			259	230 (89%)	21 - no drug 3 - cannabis + other drug 5 - other drug

3) Published Data*
(Addiction Research
Foundation)

Marijuana	Jan. 1969 to Feb. 1970	91	65 (71%)	26 - no drug
Hashish		<u>58</u>	<u>52</u> (90%)	6 - no drug
Total Cannabis		149	117 (78%)	32 - no drug
Grand Total Marijuana		229	190 (83%)	36 - no drug 2 - marijuana + other drug 1 - other drug
Grand Total Hashish		<u>179</u>	<u>157</u> (88%)	17 - no drug 1 - hashish + other drug 4 - other drug
Grand Total Cannabis		<u>408</u>	<u>347</u> (85%)	53 - no drug 3 - cannabis + other drug 5 - other drug

(j) These samples were analysed for the Commission by H.D. Beckstead, of the Pharmaceutical Chemistry Division, Department of National Health and Welfare.

(k) These samples were analysed for the Commission by J. Marshman and R. Berg of the Addiction Research Foundation of Ontario.

* Marshman, J.A. & Gibbons, R.J. A Note on the Composition of Illicit Drugs. *Ontario Medical Review*, September 1970. P. 429.

TABLE 2 QUANTITATIVE ANALYSES

Source	Drug	Number	Location	Date Obtained	Date Analyzed
A. COMMISSION SAMPLES					
1. Street Samples (j)(k)	Marijuana	15	4 Unknown 11 Ontario	Apr. - May 1971	June - Dec. 1971
	Hashish	23	23 Ontario	Apr. - May 1971	June - Dec. 1971
2. Canadian Grown Illicit Marijuana					
A) Street Samples* (j)(k)	Marijuana	11	4 Ottawa 2 Montreal 5 B.C.	Apr. & Sept. 1971	June & Nov. 1971
B) Selected Police Seizures (j)	Marijuana	4	4 B.C.	Seized Mar. - Dec. 1971	July, 1971
Total of A & B	Marijuana	15			
B. POLICE SEIZURES					
1. Sample I (j)	Marijuana	44	9 Ontario 4 Quebec 16 Prairies 11 B.C. 4 Maritimes	Seized Mar. - Dec. 1970	July, 1971
	Hashish	34	8 Ontario 5 Quebec 9 Prairies 7 B.C. 5 Maritimes	Seized Mar. - Dec. 1970	July, 1971
2. Sample II (j)	Marijuana	9	7 Ontario 2 Quebec	Seized Oct. 1971	Dec. 1971
	Hashish	9	6 Ontario 3 Quebec	Seized Nov. 1971	Dec. 1971

(j) These samples were analysed for the Commission by H.D. Beckstead, of the Pharmaceutical Chemistry Division, Department of National Health and Welfare.

(k) These samples were analysed for the Commission by J. Marshman and R. Berg of the Addiction Research Foundation of Ontario.

* Includes one sample also included in A.1, Marijuana, above.

OF SOME ILLICIT CANABIS SAMPLES

Percentage Δ^9 THC		Percentage Δ^8 THC		Percentage CBD		Percentage CBN		Percentage Total Cannabinoids	
Range	Median	Range	No. where detected	Range	Median	Range	Median	Range	Median
0.02- 3.46	0.93	0.00-0.02†	6 (40%)	0.00- 2.00	0.12	0.00-0.30	< 0.10	0.78- 4.10	1.38
1.00-14.30	4.82	0.0 -0.20‡	21 (91%)	1.09-12.90	5.50	0.00-2.63	0.66	2.80-25.39	11.32
0.02- 3.46	0.44	0.00-0.02§	8 (73%)	0.01- 1.13	0.58	0.00-0.04	0.00	0.05- 4.04	1.06
0.32- 1.02	0.80	— —	0 (0%)	0.07- 0.16	0.10	0.00-0.06	0.02	0.40- 1.20	0.94
0.02- 3.46	0.56	0.00-0.02	8 (53%)	0.01- 1.13	0.16	0.00-0.06	0.01	0.05- 4.04	1.05
0.05- 1.65	0.21	0.00-0.01	7 (16%)	0.00- 1.02	0.06	0.00-0.54	0.16	0.11- 2.12	0.53
0.00- 8.60	1.30	— —	0 (0%)	0.00-16.50	3.60	0.00-2.70	0.75	0.60-26.00	6.00
0.02- 1.53	0.27	0.01-0.03	5 (55%)	0.03- 2.20	0.29	0.00-0.03	0.00	0.31- 2.48	0.82
0.80- 6.40	5.40	0.10-0.20	3 (33%)	2.20-13.60	11.70	0.00-1.00	0.30	4.70-20.20	15.3

†Based on quantitative analyses of four street samples. Quantitative analyses for Δ^8 THC were not done at the Addiction Research Foundation.

‡Based on quantitative analyses of four street samples. Quantitative analyses for Δ^8 THC were not done at the Addiction Research Foundation.

§Based on quantitative analyses of ten street samples. Quantitative analyses for Δ^8 THC were not done at the Addiction Research Foundation.

The qualitative data are summarized in Table 1. The police seizures analysed were selected from cannabis samples in storage in the vaults of the Bureau of Dangerous Drugs.^[i] In addition, fifty-two cannabis samples were analysed which had been submitted to the Commission by private individuals.^{[j],[k]} Furthermore, we surveyed all the major analytic facilities in the country for cannabis information. Of 259 samples of alleged cannabis, one sample of marijuana was mixed with PCP (phencyclidine), one was marijuana and LSD, one was hashish and tobacco, two cases were non-cannabis plant material containing atropine-like alkaloids (perhaps Jimson Weed [*datura*]), one was aspirin (A.S.A.), and, in two instances, opium was presented to the analyst as hashish. Twenty-one cases were reported where no drug was found on analysis. Eighty-eight per cent of the samples were cannabis, as alleged. These figures are generally similar to those published previously by Marshman and Gibbons at the Addiction Research Foundation.⁴⁰³ H.D. Beckstead, Dominion Analyst at the Health Protection Branch of DNHW in Ottawa, has reported seeing no cases of cannabis adulterated with other drugs in over 1,700 samples (mostly police seizures) over the past two years, although inactive (non-drug) samples were occasionally observed.⁴³ It should be noted, however, that forensic analyses are primarily concerned with identifying suspected prohibited substances and do not generally make a special point of searching for contaminants. No cases of 'opiated' hashish or marijuana, alleged to be pure, have ever been chemically documented in Canada in spite of the popular impression that this is an established combination. Four separate samples presented to the Commission as evidence of 'opiated hash' were found to be pure cannabis resin. There have been no systematic analyses for insecticides, herbicides or infectious micro-organisms in illicit cannabis in Canada, however, and these remain a potential threat.

Police drug seizures, although in some respects a biased sample (because of the selective nature of law enforcement) are probably more representative of typical 'street drugs' than are the substances brought in to special health facilities for analysis. Unless a specific attempt is made to obtain a random sample of drugs from the 'street', the unsolicited materials brought for analysis (for example, to ARF laboratories, or to the Commission) by outside individuals are often submitted because of suspected oddities, and, consequently, as a group, probably contain a disproportionate number of deviant samples. Police seizures, by contrast, are not selected on any pharmacological basis, but data obtained from them provides a basis for direct generalization only to those sectors of the population which are the primary subjects of police attention. Although contaminated cannabis samples are retained by the authorities, non-drug substances are not generally kept unless they are part of a large seizure containing prohibited substances. These factors introduce further limitations on the interpretation of the police seizure data presented here.

In summary, it would appear that in Canada, illicit marijuana is usually cannabis, although it may be 'cut'; and hashish, with some exceptions, is generally as represented. But an important question remains as to the potency of these materials.

Many of the cannabis samples described above were also quantitatively

analysed for cannabinoid content. The police seizure data were made up of those samples in which less than a year had elapsed since confiscation.^[i] Unfortunately, due to unforeseen circumstances, the initial samples were not analysed immediately and many were stored for up to 18 months after seizure, under routine shelf conditions. This time delay may well have resulted in lower THC content due to natural degradation, but we have no accurate method of assessing this. A second, smaller sample of more recent seizures was also analysed. The Commission collected 48 illicit cannabis samples, some imported and some 'home grown', which were analysed soon after they were acquired.^{[j],[k]} The majority of these came from Ontario. A summary of the data is presented in Table 2.

A number of significant conclusions can be drawn from this summary. The data obviously confirm earlier impressions of a wide variability in potency in both marijuana and hashish. It is clear that it is not possible to discriminate consistently between hashish and marijuana on a potency basis, since considerable overlap occurs between the respective THC distributions. THC in hashish ranged from a mere trace to an unusually high value of 14.3% and, in marijuana, from 0.02% to 3.46%. The potential for overlap is made even more explicit by reports of greater than 10% THC in selected marijuana flowering tops and bracts 'grown in Mississippi, England and Jamaica'.^{74,159,174,534} Although the data are limited in their generality, on the basis of the available information one might estimate that, in Canada, 'typical hashish' contains about 5% THC, while 'typical marijuana' contains about 0.5–0.75% THC. Thus it would appear that, on the average, hashish tends to be about five to ten times as potent in THC as marijuana in this country. The relative difference in potency between the two forms seems to diminish with age—probably due to a greater THC degradation with storage time in hashish.

The basis for the significant difference between the 1970 police seizures and the various 1971 samples is uncertain. The Commission's 1971 'street' sample figures are more in line with frequent informal and limited scientific estimates that 'good average street grass' in North America contains about 1% THC, but optimal data are not available.^{280,305,363,397,414,503,678} These discrepancies may be a function of the difference in age and storage time before analysis (especially with the hashish), or result from differential selection biases in the various samples, or, less likely, may reflect a change in available marijuana and hashish to more potent materials over the past year. Some of the differences might also reflect the reliability or comparability of the chemical analytic techniques employed in the different samples. It is interesting to note that Δ^8 THC was present in less than half of these samples, and, when it did appear, only occurred in minute amounts. Carboxylic acid components were not separated from the neutral forms in these analyses.

Hashish in Canada is *not* merely a concentrated form of the marijuana available. It also differs significantly from marijuana in cannabinoid proportion patterns, in that hashish contains a much higher percentage of the total cannabinoids in the form of CBD and CBN. The pharmacological significance of this difference has not been adequately explored, but may not be of major importance.^[l] Whether the difference in cannabinoid ratios is due

to differences in age, method of curing or preparation, or environmental or genetic factors is uncertain. THC in hashish is probably less stable than in the natural plant material, and this could be partly responsible for the observed patterns. Moreover, it would appear that the marijuana is primarily from the Western Hemisphere while most of the hashish comes from the Middle East, so different cannabis strains are undoubtedly involved. Marijuana and hashish could probably be routinely and reliably discriminated chemically on the basis of the ratio of water- and lipid-soluble to insoluble fractions (mostly cellulose), although this would clearly not necessarily predict potency.

An up-to-date, continuous analysis of a randomly selected sub-sample of police seizures might be the best method of resolving the questions of cannabis purity and potency.

MEDICAL USE

There is no currently accepted medical use of cannabis in North America outside of an experimental context, although it would appear that therapeutic use by a physician is not prohibited by law in Canada. Over 20 different cannabis preparations have been marketed, mostly on a prescription basis, in Canada since 1920. Production of the last of these medicines was discontinued less than two decades ago and new supplies of cannabis are no longer available through traditional pharmaceutical channels.^[m] While cannabinoids have been reported to produce an array of possibly useful medicinal effects, the majority of these claims have either not yet been adequately investigated using modern scientific techniques, or the effects can be duplicated by other more readily available and more convenient drugs. The natural product's variability in potency, uncertain stability over time, and water insolubility, as well as a significant variability in response among different individuals and, later, the imposition of legal restrictions, were among the factors which led to its disfavour in Western 20th century medicine. However, recent advances in the isolation and synthesis of certain natural cannabinoids and closely related synthetic compounds, some of which are water soluble, have overcome some of the earlier difficulties and have prompted a second look at the therapeutic aspects of these drugs.

Cannabis has been widely used in many cultures for its medicinal properties. Cannabinoids have been used in the past and are presently employed in some countries (or are currently under clinical investigation) for their alleged anxiety-reducing, mood-elevating, appetite-stimulating, anti-convulsant, diuretic, blood pressure-reducing, analgesic (pain-reducing), sedative and anaesthetic properties. The antibiotic effect of cannabis on some bacteria has been related primarily to the CBD fraction. Cannabis has also been used to reduce insomnia, to treat coughs, tetanus, burns, earache, and migraine headache, to ease opiate narcotic and alcohol withdrawal, and as an aid in obstetrics and psychotherapy. Other uses in the past include the treatment of corns, warts and hemorrhoids. Cannabis has often been employed, and is currently used illicitly in North America, to reduce the secondary symptoms and suffering caused by the flu and the common cold.

Effects, in this regard, may be a function of the drug's reported ability to improve mood, reduce pain and perhaps lower fever.^{124,130,243,295,435,454,482,540,651}

Recently declassified United States Army studies of synthetic cannabinoids, done in the 1950s, suggested that these drugs possess a variety of potentially valuable therapeutic properties.^{157,253,638} The researchers emphasize the drug's low toxicity and suggest that cannabinoids be explored in the treatment of fever, pain, epilepsy, migraine headaches, high blood pressure and psychosis. Other new data suggest that cannabis may be useful in the treatment of glaucoma.²⁶⁴

Many of the alleged therapeutic properties of cannabinoids have not been thoroughly studied in a modern scientific and clinical context, and their general medical potential still remains a matter of conjecture. Research now in progress should clear up much of the controversy in the near future.

ADMINISTRATION, ABSORPTION, DISTRIBUTION AND PHYSIOLOGICAL FATE

Administration and Absorption

In North America, marijuana is usually smoked in hand-rolled cigarettes known as 'joints', 'J's', 'sticks', 'muggles', 'numbers' or 'reefers', the butt of which is often called a 'roach'. Marijuana cigarettes may vary in size from a few hundred milligrams up to several grams. Commission research indicates that a typical 'joint' in Canada might contain about one-third of a gram of marijuana.^[h] (Regular tobacco cigarettes usually weigh about one gram.) Depending on the potency of the material and various characteristics of the user, anything from a fraction of a 'joint' up to one or even two cigarettes might be considered a typical acute dose. Hashish is also sometimes smoked in cigarette form, perhaps mixed with tobacco or marijuana for easier burning, but is more often smoked in a pipe, or burned on the tip of a pin or tobacco cigarette. A variety of conventional and special pipes, including water pipes (*hookahs*) and custom-made instruments are commonly employed in the smoking of hashish and marijuana. Cannabis is routinely mixed with tobacco and, less often, with other active drugs in the East and South America, but these practices are not as common in North America.

Although the literature is inconsistent, it would appear that approximately one-half of the THC and THC acids present in a cannabis cigarette are available as THC in the smoke after combustion.^{179,399,618} Commission research has confirmed this estimate in natural plant material, with slightly lower figures for alfalfa impregnated with synthetic Δ^9 THC.¹⁸⁰ With the exception of the change of cannabinoid acids to neutral forms, there seems to be little consistent alteration in the proportion of cannabinoids which survive burning. Under some conditions, a significant proportion of the THC may escape in the side stream of smoke between inhalations, or remain in the butt of the cigarette. Consequently, users generally smoke all of the available material, including the 'roach', and minimize 'dead' burning time by passing around and sharing the cigarette. The proportion of THC delivered when cannabis is smoked in a pipe or a water pipe may not be the same as that in

cigarette form,¹⁸⁰ but possible differences have not yet been clarified. Neither has the pyrolysis of hashish been adequately studied and compared with other cannabis forms.^{8,180} Major problems with the quantitative analysis of cannabis call into question much of the past and present work in this area.

Cannabis smoke is usually inhaled deep into the lungs and held there for an extended time, in order to maximize absorption of the active compounds. While cannabis users in North America often retain the smoke in their lungs for up to a minute or longer, preliminary laboratory data suggest that the retention of almost all of the cannabinoids in the inhaled smoke may occur after a considerably shorter interval (less than half a minute may be sufficient).^{399,487} By contrast, prolonged retention of inhaled smoke is not common among cannabis users in either India or Jamaica, although deep inhalation techniques are typically used.^{412,534} On the basis of the present data, then, it would appear that under optimal conditions, a smoker may absorb up to one-half of the THC available in the cannabis material. Under most conditions however, both social and experimental, considerably less of the THC actually enters the physiological system.^[n] The lack of standard administration techniques generally renders detailed or quantitative comparisons quite tenuous, both among experiments and between laboratory and social situations.

The onset of psychological effects is almost immediate when smoking the more potent forms of cannabis, and the peak effects usually occur within minutes of administration. Depending on dose, major effects usually last several hours while milder ones may endure for half a day or longer.

Absorption of THC by the gastrointestinal tract is quite effective, but relatively slow and erratic.³⁵⁹ The food content of the stomach may affect the rate of absorption. Even though cannabis resin is poorly soluble in water, effective emulsions or suspensions of cannabinoids in water can be achieved for oral consumption, and in the East cannabis is often used in making tea or other beverages. Mild *bhāṅg* drinks, served cold, are common in parts of India. In some countries, hashish is incorporated into buttered candies, called *majoon*, or into other foods. Prior cooking may increase the potency of eaten cannabis by changing inactive THCA to THC. The effects of cannabis taken orally usually begin after about an hour and gradually reach a peak within several hours, then slowly decline. Several investigators have reported a surprisingly abrupt (but delayed) onset of potent symptoms after ingestion.^{16,243,402} Very high doses may produce acute effects lasting more than a day, although the drug is not ordinarily used in such large quantities in North America. Cannabis is also effective when administered rectally.

The subjective effects of eating cannabis are sometimes said to be noticeably different, qualitatively, from those of smoking. It is uncertain whether this alleged difference might be due to chemical changes resulting from the heat in smoked material, the effects of the digestive juices or other metabolic processes after ingestion, or differences in rapidity and efficiency of absorption and distribution with the two methods. In spite of the THC loss due to burning, on a weight basis, inhalation is the more effective mode of administration; THC in material smoked reportedly produces effects comparable in intensity to approximately three times the same quantity taken

orally.^{296,298} Since, at most, only half of the original THC in smoked cannabis is actually delivered and absorbed, inhalation may be five to ten times as effective a mode of administration. This general formula may not apply to crude cannabis preparations if a substantial proportion of the THC present is in acid forms (THCA), since these compounds are apparently inactive when taken orally, but are converted to active THC when smoked. Furthermore, if THC is given by oral ingestion, the vehicle in which it is administered (for example, alcohol, sesame oil or glycocholic acid solution) can significantly affect the rate of absorption and the intensity and duration of the drug effects.⁴⁹⁵ Clearly, further work is needed in this area employing up-to-date analytic techniques.

Since Δ^9 THC is poorly soluble in water, adequate injection procedures are difficult to achieve. A variety of solvents and other agents have been employed as injection vehicles in animal experiments with varying degrees of success. Interperitoneal injections are inefficient and often cause serious complications,^{270,272,580} and intravenous administration of pure materials is difficult. Water soluble THC derivatives have recently been developed, but their similarity to natural THC has not yet been established.^{287,516} There have been a few reports of individuals self-injecting crude concoctions of cannabis extract intravenously. Such injections can produce serious adverse effects which may not be attributable solely to the pharmacological properties of the cannabinoids, but may occur in reaction to other insoluble foreign particles in the prepared concentrate.

Distribution, Biotransformation and Excretion

Although THC in pure form has high fat solubility, recent animal studies indicate that the drug does not seem to show any specific affinity for neural tissue, nor does it appear to concentrate initially in the body's fat stores. Initial distribution of the drug seems to be determined primarily by the vascularity of (or the blood flow through) the tissues. THC and its metabolites accumulate quite rapidly in the liver, kidneys, spleen and lungs—the primary organs of absorption, metabolism and excretion. A significant amount may also be found in the testes.^{8,83,271,338} No significant blood-brain barrier exists in mice.²²² The relative concentration of metabolites in bile, gastrointestinal tract and bladder increases until excretion. In rodents, THC has been shown to cross the placental barrier and enter the foetus in pregnant females.²⁹⁴ Sex differences in sensitivity to cannabinoids have been demonstrated in some animals, which may be a function of differences in drug metabolism, and in body water and fat. Females of some species seem to be more responsive to cannabis effects than males.^{80,137,471} No comparable human studies have been reported to date. (In both animal and human studies, males have been predominantly used as subjects.)

THC is extensively metabolized in humans, primarily in the liver, but also in other tissues, including the lungs, and the various metabolites are excreted in the feces and urine. Little or no free or unaltered THC is eliminated from the body. Although much of the administered THC is almost immediately bound to lipoproteins in the blood plasma,^{338,643,669} metabolism apparently begins nearly as soon as the drug enters the body, and metabolites have been

identified in plasma within minutes after administration. The major THC metabolites are mono- and dihydroxy compounds. Deriving from these primary metabolites are a large number of secondary metabolites. THC is progressively metabolized, primarily by non-specific oxidases in the microsomal enzyme system in the liver. This may be a significant factor for drug interaction considerations, since many other drugs are metabolized by the same system.

In man, studies of radio-labeled materials suggest that about one-half of the THC metabolites are excreted within a few days, and most are eliminated within a week, although small amounts may be retained for longer periods.^{359,361} (In this respect, cannabis is more similar to some of the major tranquilizers, sedatives and anti-depressants than to alcohol, which is more quickly metabolized and excreted.) Some investigators have cautioned that cannabinoid metabolites may persist in the body for extended periods (especially with chronic heavy use), perhaps producing cumulative effects of possible adverse consequence.^{80,489} There is little experimental evidence of this in humans to date, but the possibility must be thoroughly explored. Excretion might be slowed by an apparent entero-hepatic circulation (seen in animals) in which some of the metabolites which are excreted via the gall bladder and bile duct into the intestine, are subsequently reabsorbed and recycled.³³⁹ Increased toxicity, with time, of massive doses of cannabinoids, repeated daily, has been noted in rodents,^{225,502} but relevance of these conditions to humans has not been demonstrated.

Metabolism and excretion of cannabinoids is apparently more rapid in chronic daily cannabis users than in inexperienced subjects.³⁶¹ Regular use of cannabis may increase the body's production of THC metabolizing enzymes in a fashion similar to that occurring with barbiturates. This suggests a mechanism for tolerance, and perhaps cross-tolerance to other drugs using the same metabolic enzyme system for biotransformation.^{80,491}

A major metabolite, 11-hydroxy THC, appears rapidly in the blood of humans after cannabis has been administered,^{358,361} and has been shown to have pharmacological activities similar to, and perhaps more potent than, THC in animals.^{128,223,618} This finding supports earlier speculation that the primary effects of cannabis may be due, at least in part, to THC metabolites, rather than to the original molecule alone.⁴²⁰ Such a phenomenon might offer a partial explanation for the "reverse-tolerance" or "sensitization" to cannabis effects often reported in users. Other hypotheses bearing on this phenomenon will be discussed later in the section on Tolerance and Dependence.

The Detection of Cannabinoids in the Body

The identification of cannabinoids and their metabolites, and their distribution in body fluids and tissues, as discussed above, has primarily been based on research involving small quantities of radio-active materials. To date, no simple and efficient method has been developed for the detection and quantification of unlabelled cannabinoids in the body. Consequently, it has been impossible to directly relate cannabis effects to plasma or tissue drug (THC or metabolite) levels. Some gross relationship between subjective effects

and general plasma radio-activity has been seen, however. Greatly improved research techniques for both quantitative and qualitative analysis of cannabinoids and their metabolites in body tissue, blood and urine are currently being developed. The fluorescent assay of biological fluids pioneered by King and Forney³³⁶ is being extended by Bullock⁹¹ into a very sensitive method for detecting metabolites. Improved extraction and detection methods for cannabinoid metabolites in urine have been reported, including a simple and relatively fast thin layer chromatographic method based on conversion of the metabolites to cannabinol.^{17,129,317,520,677} Radioimmunoassay techniques^{94,96,182,203,552} and spin-label immunoassay techniques^{289,365} are currently being developed.^[o] The latter method could be applied routinely to large numbers of cases as it takes very little time (5 minutes) but requires expensive equipment and a supply of THC antibody. However, even these techniques being developed may have limited practical applicability outside of the research laboratory.

It is sometimes possible to detect the use of, or general contact with, cannabis from saliva samples or from chloroform skin swabs after intervals of hours or even days.^{524,589} In addition, it may be possible to detect the odour of cannabis smoke on users or on their breath. However, these techniques would not provide quantitative information regarding the magnitude of dose used or absorbed, or the intensity of intoxication, and therefore cannot be of much use in determining concurrent cognitive or psychomotor impairment.

THE REVIEW OF CANNABIS EFFECTS: SOME GENERAL CONSIDERATIONS

The Scope of the Review

This review of cannabis effects deals primarily with more recent human studies, although considerable attention was directed to the earlier literature and to animal studies in preparing this summary. In many instances, these latter reports are of questionable value here, both with respect to scientific validity and social relevance. On the other hand, it is interesting that very few significant findings of cannabis effects have emerged from the more recent controlled pharmacological studies which were not at least suggested in the earlier literature. Apparently, considerable effort has gone into "separating the wheat from the chaff" in previous methodologically limited reports.

In general, references to animal studies will be restricted to the few areas where significant contributions have been made in the direction of establishing or suggesting effects in humans. The majority of animal experiments on cannabis effects have used enormous doses and questionable techniques of administration, and provide little data which can be generalized to other species, especially man. In addition, most animal behavioural studies have been concerned with effects of undetermined relationship to the major areas of interest with respect to human use. While this may be less true of biochemical and physiological studies, even here considerable inter-species differences often drastically restrict generalizations. For example, the rodent cardiovascular response, the rabbit eye blink reflex and dog ataxia indices

frequently noted in the literature are, to a certain extent, idiosyncratic to those species and provide limited information regarding others.

While animal toxicology studies are *de rigueur* in classical medical pharmacology, many investigators have questioned the wisdom of focussing limited time and financial resources at this time on cannabis studies involving animal species and tests of questionable applicability to man. The assumption is often made in toxicity studies that one can accurately estimate the effects of long-term use of moderate amounts of a drug on the basis of information obtained from sub-chronic administration of massive doses to lower species. The predictive validity of such procedures has not been clearly established and is the subject of much controversy. Admittedly, in some situations, one has little choice but to experiment on animals. In certain circumstances, such studies have led to significant advances in human pharmacology, but in most behavioural areas this has been the exception rather than the rule. Additional effort should be made to empirically develop animal tests which adequately parallel effects and conditions of primary interest in humans. We will make occasional references to animal experiments, especially those involving primates, where they are deemed appropriate and relevant.

It may be important to note that the vast majority of both human and animal pharmacological studies of cannabis have employed only male subjects. With very few exceptions, when general information about the effects of the drug is sought, males are used—females are rarely studied scientifically except when some specifically female characteristic is under consideration. To be sure, there are often justifiable biological, social and practical reasons for excluding female subjects in certain studies, but the information gap which now exists in this area may well be significant.

In human studies, two basic approaches have emerged. Some experiments were clearly designed to test for effects of the drug on some specific behaviour or function of independent interest, such as automobile driving or visual acuity, for example. The second approach is more open-ended and concerned with exploring and delineating the general or dominant characteristics of the drug response. In the area of psychopharmacology, until recently, few tests had been developed or refined for sensitive assessment of the major characteristics of the cannabis 'high'. Many standard instruments are inappropriate and insensitive to the dominant effects or may merely quantify the response to the drug on some often arbitrary and abstract dimension of little social relevance.

The Question of Dose

With all drugs, responses differ, both in the intensity and character of the reaction, according to the amount of the drug administered. The relationship between the dose and the intensity of an effect is often referred to as the *dose-response* or *dose-effect relationship*. For every drug there is a dose low enough so as to produce no noticeable reaction, and at the opposite extreme, some degree of toxicity or poisoning can be produced by any substance if enough is taken. No drug can be designated either safe, beneficial, or harmful without consideration of the dose likely to be consumed. Consequently, it is usually essential to study a drug's effect over a range of doses in order to obtain an

adequate understanding of the nature of the response. It is, of course, important to consider doses which have some relevance to existing or potential patterns of use, if social implications are to be inferred from experimental findings.

Accurate quantitative information regarding the potency of the materials used in even recent cannabis experiments is questionable due to technical problems in chemical analysis, but it would appear that the majority of the existing experiments have been more concerned with finding a dose which produces an effect, rather than with exploring effects at doses and under conditions of primary social concern and relevance.

The general question as to the appropriate range of cannabis doses to study is made more complicated by evidence of considerable individual differences in sensitivity to the drug, even when subjects have had a similar past-use history, and a growing body of information regarding the importance of the set and setting in determining effects. The situation is further compounded by evidence that chronic frequent users may develop some degree of tolerance and may use acute doses which are likely to cause untoward effects in novices or more casual users. In addition, significant behavioural adaptation to some of the initially disrupting or distracting aspects of the 'high' appears to occur with even limited experience with the drug, and such effects cannot be explained by "classical tolerance". In addition, there is frequent mention of a "reverse tolerance" or increased sensitivity to the drug after initial use in some individuals. (Factors related to tolerance are discussed in detail in a later section.) Consequently, in some circumstances, the doses studied may have to be adjusted to the individual characteristics and previous drug experiences of the subjects involved.

Until recently, relatively little was known about the actual quantity of psychoactive material administered and absorbed by users. Recent advances in chemistry have enabled some progress in this area, and more sophisticated social research has also contributed significantly.

It would appear that there is little experimental research which provides information on cannabis doses typically used in North America today. While high-dose acute studies are of course necessary and of interest in themselves, since a certain minority of regular users undoubtedly consume relatively large quantities of cannabis, a significant gap apparently exists in our knowledge of the effects of cannabis at doses and patterns of use which most frequently occur in North America and other industrial countries. While there is evidence that certain extreme chronic users of hashish in the East, for example, may smoke several hundred milligrams of THC per day^{45,414,444} (often in water pipes) and might be able to tolerate acute doses approaching one hundred milligrams, there is growing evidence from a variety of sources that in North America, most users smoke less than ten milligrams of THC to get 'high' or 'stoned'.^{8,111,276,296,362,397,413,414,431,436,661}

A number of studies indicate that regular users typically smoke anything from a fraction of a 'joint' up to a few cigarettes in a session (which may extend over several hours).^{68,89,248,276,321,413,415,475} The size of marijuana cigarettes may range from a few hundred milligrams up to a several gram 'bomber', but numerous investigators have reported that a typical 'joint' is usually less than

half a gram.^{92,276,305,362,363,411,413} Commission research confirms these estimates.^[h] Although the potency of various samples of marijuana and hashish varies over a vast range, the notion that ‘good average weed’ is approximately 1% THC in North America is commonly expressed in the literature and has some documented support (although existing Canadian data suggest that about half that figure might be a more accurate estimate for this country—see Table 2).^{280,305,362,397,414,478,503,661,678} If 1% THC-marijuana were about average for experienced users, then a ‘typical’ 400 mg ‘joint’ would contain 4 mg THC. Since users often report that one or two ‘joints’ per person is a typical dose for a full evening session, it would appear that a single acute dose of five to ten milligrams in most individuals would produce substantial effects equal to or greater than those usually sought. Commission socio-pharmacological research and laboratory experiments provide considerable support for this notion.

In addition to survey, interview and participant observation investigations, the Commission conducted an exploratory study of characteristics of cannabis use in a primary group of 14 employed persons or students who had developed a rather stable pattern of consumption, with most smoking several times a week.²³⁸ These subjects were asked to keep a daily diary of drug use over a period of one month, using standard information forms assessing such variables as identity and quantity of drugs used, other persons involved, events associated with drug use and a subjective rating as to the relative intensity of the ‘high’ achieved. Specific weights of marijuana or hashish consumed were obtained with standard scales in many instances, and the samples involved were quantitatively analysed for cannabinoid content. (In this study the median THC content^[k] for marijuana and hashish was approximately 1% and 5%, respectively.)

Although complicated problems arise in the analysis of the data obtained, some general estimates of THC consumption can be made. We have no proof of the accuracy of the self-reports or of the quantities of THC actually consumed. One hundred sessions (averaging 2.28 individuals each) provided data for the following figures. Cannabis was most often taken in small groups of two or three persons, although isolated use and large groups were also described. Estimates of the mean THC used per individual in each session ranged from 1.3 mg to over 50 mg Δ^9 THC, in several instances, with a median of 6.2 mg. THC consumption tended to be slightly lower with marijuana than with hashish. It should be stressed that sessions were typically several hours long (but ranged up to 12 hours), and that these figures do not generally represent a single acute dose. These estimates are, at best, a conglomerate average based on marijuana and/or hashish (occasionally used together in a session) in either cigarettes or pipes, and is further complicated by minor alcohol consumption in approximately one-third of the sessions. The figures obtained, however, generally corroborate the estimates of “typical acute doses” obtained from other sources.

In Commission laboratory experiments we found that when smoking techniques were used which maximized the delivery and absorption of THC, cigarettes containing 5 to 10 mg THC, completely smoked, produced effects which were beyond the range of cannabis experiences of some regular users

who had been 'turning on' several times a week for a number of years. As will be discussed in more detail later, acute adverse anxiety reactions occurred in a few individuals at these doses. Subjects indicated that cigarettes containing about 6 mg THC produced effects generally comparable to those typically experienced when 'high' or 'stoned'. Furthermore, Miles and associates reported that when cannabis users were allowed to select their own marijuana doses daily for a period of several weeks in the laboratory, on the majority of occasions, subjects consumed 2-4 mg of THC to get 'high'.⁴³⁶ While considerable limitations must be placed on generalizations among various laboratory and social conditions of use, the estimates of typical acute doses obtained from a number of independent sources are in general agreement.

The Importance of Time

Another important pharmacological concept is the *time-response relationship* or the relation between the time which has elapsed since drug administration and the effect produced. Such a temporal analysis may be restricted to immediate or short-term (acute) effects of a single dose, or on the other extreme, may involve the long-term effects of persistently repeated (chronic) use of a drug. Studies of shorter periods of repeated administration are often referred to as *sub-chronic*.

The intensity, and often the character or quality of a drug's effects may change substantially within a short period of time after administration. An initially stimulating effect, for example, may later change to one of sedation. With some drugs, an initial state of tension or anxiety may later turn into one of relaxation and a sense of well being, or vice versa, as a function of time. Consequently, it is often essential to obtain measures at several points in time.

It is also important to consider the long-term consequences of chronic drug use (especially at higher doses). Often such effects cannot be readily predicted from what is known of the immediate response. For instance, while there is little doubt that the smoking of a few tobacco cigarettes has no lasting detrimental effect on lung or cardiac function, there is increasing scientific evidence that long-term heavy use of this substance has serious consequences. As another example, the clinical picture of the chronic alcoholic involves psychological and physiological disturbances which do not develop with intermittent drinking of shorter duration. In simple terms, it is essential to ask "How much?", "How often?", and "For how long?" (as well as "By whom?") when discussing the long-term reaction to repeated drug use.

Commission Experiments on Cannabis Effects

The Commission has undertaken four experimental projects concerned with the acute effects of cannabis and, in some instances, of alcohol, in humans. The experiments covered a wide range of measures, but were primarily focussed on obtaining time- and dose-response effects in certain crucial areas. One experiment was concerned with the effects of cannabis and alcohol on certain automobile driving tasks. A second study was designed to determine some of the effects of cannabis and alcohol, both alone and in combination, on psychomotor tracking performance. A third study examined

the effects of cannabis on visual signal detection (attention and vigilance) and, secondarily, the recovery of dim-light visual acuity after glare. The largest experiment was designed to assess the effects of cannabis on a variety of subjective, behavioural and physiological measures, and to quantitatively and qualitatively compare synthetic high purity Δ^9 THC with natural marijuana of identical Δ^9 THC content on these variables. In all experiments subjects were paid volunteers, mostly university students, who had experience with alcohol and cannabis but no history of heavy use of either these or other drugs. Subjects were psychiatrically screened and those with detectable pathology excluded.

Standard .4 gm cigarettes of marijuana were used in all studies except one, in which both THC and marijuana were smoked. Cannabis doses were administered on an individual body weight basis under standardized conditions of smoking which maximized THC delivery and absorption. THC quantities studied in the main experiments ranged from 9 mcg/kg to 88 mcg/kg, which, in a typical subject, resulted in minimum and maximum doses of 0.67 and 6.6 mg THC. The lowest dose was used in only one study, to determine and compare the threshold for detectable reaction for pure THC and for marijuana. The higher dose was intended to approximate the effects typically sought by regular, confirmed cannabis users in North America. Analysis of the data from these experiments indicates that although considerable individual differences exist among subjects, we were generally successful in approximating these limits. Intermediate doses were also studied. Apparently, very little experimental information as to cannabis effects in this dosage range is currently available, although differences in administration techniques and cannabis THC content analyses among various studies make definite comparisons of the actual doses absorbed by the subjects difficult. Three of our studies had two or more drug conditions in common, thereby facilitating certain comparisons among the experiments, and providing a broader data base for generalizations from a number of common measures than has usually been available in the past.

References to the findings of these various experiments are made throughout the general review which follows, and more detailed summaries are presented in Annex A at the end of this chapter. General interpretation and discussion of the findings are presented in the main text, however. The Commission's experimental program will be described in considerably more detail in supplementary technical reports. In addition to these specific experiments, new information as to the effects of cannabis has also been obtained from a variety of Commission sources: social, survey and interview studies of cannabis users in Canada; exploratory investigations of the experience of the medical profession and of others working in treatment facilities; special Commission symposia; and numerous briefs presented to the Commission.

Pharmacologically Active Constituents of Cannabis

It is widely accepted that one isomer of THC (Δ^9) is the major active compound in hashish and marijuana. Mechoulam⁴²⁴ and others have argued that it is the only significant active constituent and can be generally considered pharmacologically equivalent to crude cannabis. This contention is supported by a variety of chemical and pharmacological evidence.

In 1967, Isbell and associates, using 'early' samples of relatively pure Δ^9 THC administered orally or by smoking, reported that experienced cannabis users readily recognized the subjective effects of the compounds as "marijuana-like".^{296,298} In addition, the physiological reactions observed in these experiments were similar to those usually attributed to crude cannabis. Although the quantity and purity of the THC used by Isbell and associates is questionable in light of what is now known about the isolation, synthesis and quantitative analysis of cannabinoids, these general qualitative observations have been corroborated on numerous occasions.⁶⁵⁵ Hollister's group, for example, has investigated the effects of Δ^9 THC on humans over the past several years,²⁸⁰ and these studies have confirmed earlier observations as to the qualitative similarity between THC and marijuana, on both subjective and objective measures.

Until recently, the only other naturally occurring compound which had been shown to have significant behavioural effects was Δ^8 THC. While this isomer is undoubtedly psychotropic in humans, it is generally present in only minute amounts, if at all, in most marijuana and hashish samples. Cannabidiol (CBD) and cannabinol (CBN), the only other typically prevalent cannabinoids, have not been shown to have any substantial behavioural activity when administered orally in humans²⁹⁸ or intravenously in monkeys.⁴²⁴ The only direct pharmacological comparison that has been done between Δ^9 THC of high purity, and crude cannabis preparations has been done with monkeys.⁴²⁴ These studies showed a general parallel between certain behavioural and physiological effects of Δ^9 THC and a petroleum ether extract of hashish at various matched doses administered intravenously. No other lipid-soluble hashish fractions tested in these animals showed any evidence of significant activity nor was there any evidence of interaction among cannabinoids.

Recently, a number of researchers have challenged the notion that a single isomer of THC can account for the pharmacological action of cannabis in humans and animals.^{111,161,222,223,280,307,309,430,655,679} In some instances, such objections have been raised because of frequent accounts that experienced users report some minor subjective response to extracted marijuana placebo in laboratory experiments, in spite of the confirmed absence of cannabinoids in the material. It has also been noted that experienced cannabis users often claim the ability to differentiate among varieties of cannabis and contend that various samples may produce noticeably different effects which are, to some extent, independent of dose.^{248,438} Furthermore, there have recently been several papers reporting some pharmacological activity in previously unidentified cannabinoids and, in some instances, non-cannabinoid substances.^{49,225,341,429} Gill and associates have suggested that certain peripheral

atropine-like effects of cannabis may be accounted for by water-soluble non-cannabinoid compounds recently identified and tested in animals.²²⁵

Isbell and associates, in the original studies, were not able to directly compare, in a controlled quantitative fashion, all of the various cannabinoid compounds investigated, but tentatively concluded that the "pure" THC compounds tested had considerably less pharmacological activity than cruder THC and marijuana materials. The researchers also found some suggestion of THC and CBD interaction in humans.^{296,298} Quantitative conclusions from this 'early' work are restrained by the comparatively primitive cannabis chemistry of five years ago, and by the limited range of effects assessed. Recently there have been suggestions of CBD and CBN activity at high doses in some animal species.^{128,372,491,662} In addition, several problems emerge in the interpretation of some aspects of the monkey studies of Mechoulam and associates.⁴²⁴ Although there appear to be considerable objective behavioural and physiological similarities between monkey and human reactions to cannabis, no adequate techniques have been employed to measure the subjective aspects of the drug response in these animals. Since in humans cannabis effects are most striking in this phenomenological area, a significant gap remains regarding the effects which reportedly reward or reinforce use in society. Furthermore, since lipid-soluble extracts of hashish were studied (intravenously), it is possible that minor water-soluble compounds may have been missed.

Current data suggest that burning has relatively uniform effects on the relative proportions (non-acid) of cannabinoids and does not substantially introduce new compounds, but the pharmacological equivalence of cannabis administered intravenously, orally or by smoke inhalation has not been established. This fact further limits the generality of both Mechoulam and Isbell's work. At least one metabolite of THC has been shown to be pharmacologically active, and since both metabolites and unchanged THC tend to become rapidly protein or albumin bound in plasma, there may be a possible interaction or competition among cannabinoids for metabolic enzyme or binding sites. Recent evidence that CBD and CBN may alter the metabolism of THC and other drugs is also relevant.^{346,491,662} Consequently, even if Δ^9 THC were the only psychotropically active constituent, other cannabinoids might alter the general cannabis response indirectly through interaction with THC.

In summary, it is clear from the literature that Δ^9 THC produces subjective and physiological effects which are similar in many respects to those elicited by marijuana and hashish, but no direct quantitative comparison has previously been done in humans of the effects of relatively pure isolated or synthetic THC and crude cannabis materials or other cannabinoids. In many scientific circles, there has been an almost complete and often unquestioned reliance on the Δ^9 THC content of cannabis as a basis for standardizing and comparing different studies, even though the pharmacological equivalence among different cannabis forms accomplished with this procedure had not been directly tested. One of the Commission projects was designed to provide an initial step in bridging this gap.

The first phase of the project⁴⁴⁰ was to compare Δ^9 THC with natural

marijuana under standard conditions.^[p] Three doses of synthetic high purity Δ^9 THC in hexane-extracted alfalfa, three doses of marijuana of matched Δ^9 THC content, and an extracted alfalfa placebo were given under controlled standardized conditions to a group of 14 experienced male cannabis users. The lowest dose was aimed at establishing general pharmacological threshold values and the upper dose was intended to approximate the 'high' usually sought by regular users in North America.

Based on a review of the literature and preliminary laboratory work, a condensed test battery was constructed which was intended to assess most of the major acute cannabis effects previously identified experimentally, and to tap some of the prominent subjective features of the cannabis 'high' as reported by users. This battery was begun immediately after smoking and was repeated four hours after drug administration. Certain isolated measures were taken more frequently, and a few tests were given only once. Measures employed in this experiment included subjective ratings of the intensity of the 'high' and post-session quantitative and qualitative descriptions, a specially designed multiple choice self-report questionnaire, the Clyde Mood Scale,¹³⁵ heart pulse rate, salivation, conjunctival congestion, finger temperature, tonic skin conductance, visual imagery, auto-kinetic movement, two-flash fusion threshold, visual spiral after-effect, time production and time estimation, finger painting, speech performance, momentary and sustained muscle strength, tapping speed, short-term memory and other cognitive functions. In addition, experimenters rated each subject's behaviour. At the end of each session subjects were encouraged to compare the nature of the 'high' obtained on the various days.

Of 21 variables measured, 13 were shown in this experiment to be generally sensitive to cannabis effects and seven of these exhibited orderly dose- and time-response functions. No consistent qualitative or quantitative differences were found between equivalent doses of the crude marijuana and the Δ^9 THC on the various measures described. Although the interpretation of a few of the specific measures is still somewhat ambiguous, we have concluded that the two cannabis materials tested are not significantly different. This finding does not exclude the possibility that differential effects might have been obtained on other measures, or that different strains of marijuana or hashish might give slightly different results. Since our marijuana sample was unusually low in other cannabinoids (more than 90% of the total cannabinoids were Δ^9 THC), generalizations from this experiment must be restricted accordingly. The direct investigation of possible interaction effects among smoked THC, CBN and CBD, in various doses and combinations, had been anticipated in follow-up, but time limitations have prevented further study. Until further data are available, it would seem prudent to specify CBN and CBD, as well as THC, content of materials used. Carboxylic acid fractions should also be specified if the drug is to be given orally.

It should be stressed that this study was focussed on the acute effects of cannabis and can provide only suggestive evidence as to the pharmacological equivalence of the chronic administration of THC and crude cannabis

preparations. It is possible that other cannabis constituents might contribute to chronic effects that were not detected in this short-term study.

It has been suggested in the literature that because of possible psychotropic effects of extracted marijuana placebo preparations, some other plant material which resembled cannabis in taste and appearance might better be used as placebo.⁴³⁰ In one Commission experiment, extracted alfalfa was used as placebo and in the other three, hexane-extracted marijuana served this control function. (This extraction does not remove water-soluble compounds.) The placebo marijuana was prepared from a different cannabis strain than the active material used in the experiments. Cigarettes were smoked under identical conditions in all four studies, using similar subjects, and no evidence of a differential response to these two placebo materials was obtained. While some measureable effect of smoking placebo material occurs, these reactions are probably a general response to smoke inhalation (including carbon monoxide) and the inhalation techniques involved, as well as to factors associated with the users' past experiences and expectations.

Quantitative Comparisons Among Cannabis Studies

In spite of attempts to increase the precision of cannabis studies by specifying the quantities and THC content of the material involved, even recent investigations must be interpreted generally and detailed comparisons are often difficult to make. Specific quantitative comparisons among different experimental and social studies are confounded by a number of methodological and technical difficulties and inconsistencies, among them:

- (1) As previously discussed, all of the earlier and most of the present quantitative analytic methods in use for estimating cannabinoid content in cannabis give generally unreliable and erratic results, both within and between laboratories. The margin for error in this regard is often considerable.
- (2) While certain aspects of cannabinoid degradation and shelf life have recently been elucidated, storage conditions of samples used in many studies were apparently not optimal for potency stability (in most reports this information is omitted), and the actual potency of the materials at the time of use may have been considerably different from the original assay.
- (3) Techniques of cannabis administration have not been standardized. The differences in response to cannabis given orally, by injection or through smoke inhalation have not been fully explored. It is known that substantial differences exist with various smoking techniques. Studies published in the last two years have included the use of regular pipes, water pipes and various sizes of cigarettes. Although conclusive data are yet unavailable, it is likely that these different smoking techniques result in different degrees of THC ultimately delivered to the smoker due to such factors as differential side stream loss, pyrolysis and condensation of volatile cannabinoids before the smoke is inhaled. In addition, in many experiments the total cigarette is not consumed or this information is not presented. Since the 'butt' or 'roach' may

contain more than 20% of the THC in the original cigarette, this can be a significant factor.⁶¹⁸

- (4) Even with a consistent system of THC delivery, different patterns of smoke inhalation and breath retention result in different quantities of THC absorbed. The standardization of oral doses might ultimately be simpler, but in North America today it would be considerably less relevant. Although absorption of cannabinoids from the gastrointestinal tract is generally complete, results obtained from oral administration are often erratic, and may be significantly influenced by the vehicle employed, and a number of unanswered questions exist as to the effects of stomach food content and gastric enzyme and acid conditions on the rate and extent of the absorption and metabolism of cannabinoids. Although intravenous injections of small quantities of synthetic THC in alcohol solution have apparently been successfully used, this technique has obvious limitations. The water insolubility of natural cannabinoids prevents simple injection techniques.

Standard smoking techniques, maximizing delivery and absorption of specified doses, would seem optimal at the present time, even if such rigidly controlled smoking regimes result in some sacrifice of ecological fidelity. Alternatively, some researchers feel that a certain subjective state (for example, a 'typical high') should be the criterion for dose, and quantities given to different individuals should be adjusted accordingly.

Recently McGlothlin, in a series of excellent reviews of the cannabis literature, has gone to considerable effort to specify doses administered in each study discussed and even to estimate THC content of materials not originally specified by the investigator.^{411,414} While such detail is clearly of value in some respects, we are of the opinion that for the purposes of this report, focussing on specific quantitative aspects of most studies is generally not justified for the previously stated reasons, and may merely provide an illusion of precision (and often contradiction) where none exists. Consequently, in this review, with the exception of Commission investigations (and the annexes to this chapter), specific doses used in the various studies discussed are not presented, although general comments are often made about the cannabis quantities involved.

PHENOMENOLOGICAL, PERCEPTUAL AND SENSORY EFFECTS

Some Subjective Characteristics of the Cannabis 'High'

The subjective psychological effects of cannabis vary greatly with a number of factors and are often difficult to predict. The dose, type of preparation, and rate and mode of administration can often greatly influence the response. Furthermore, the psychological effects depend to a considerable degree on the personality of the user, his past experience with cannabis or other drugs, his attitudes, the setting in which the drug is used and other idiosyncratic factors. The response of the naive subject may be much more variable and unpredictable than that of an experienced user. Recently Jones has shown

significant differences between the effects of standard doses of marijuana given subjects in isolation and in groups in the same laboratory setting.³⁰³

Becker has suggested that the nature of the cannabis 'high' traditionally depends on a number of social and learning factors. An individual must first learn the proper technique of smoking cannabis; he must learn to recognize some of the more subtle aspects of the subjective effects; and thirdly, because cannabis effects are not necessarily inherently pleasurable, the novice user must often learn to enjoy the response he has come to recognize as cannabis induced. In different situations, the effects experienced may be socially defined as positive or negative.^{39,40,42} This analysis is extended to adverse psychological reactions in a later section of this chapter.

Although hashish may be many times more potent than marijuana, the effects of these two forms of cannabis, as usually used in North America, are generally similar and often indistinguishable. It has been reported that most experienced individuals smoke to attain a certain effect or level of 'high', and adjust the dose according to the potency of the substance used. 'Grass' and 'hash' are generally used interchangeably in Canada. Although it is generally easier to consume excessive quantities of THC in the form of hashish, great variations in potency of different samples are usually accommodated by the experienced user through a "titration" of dose (intake is reduced or stopped when the smoker reaches the preferred level of intoxication). Comparable precision is generally not possible with cannabis taken orally, however, due to the long delay in action, and a "non-optimal" effect is therefore more likely to occur with this mode of administration. Both the phenomenon of "self-titration" and the equivalence of the marijuana and hashish 'high' have not been well explored in the laboratory. In some Eastern countries, different social norms have evolved around the different forms of cannabis, and the pattern of drug use associated with *bhang* drinks may be quite different from that seen with the smoking of hashish. Long-term heavy cannabis users invariably prefer the more potent *ganja* or hashish.

It is often difficult to find descriptions of the subjective effects of marijuana that are free from value judgements. Many effects seem to take on good or bad connotations depending on the circumstances in which they occur, the personal attitudes of the individual undergoing the experience, and the orientation of the observer who is recording them. Moreover, since many of the significant psychological effects are intensely personal, the laboratory scientist often has little opportunity to make objective measurements, and must rely on subjective, introspective reports communicated verbally through a language system which is frequently inadequate.

As noted earlier, some investigators object to cannabis being classified with LSD and similar substances. It is often suggested that marijuana is a mild intoxicant, more like alcohol. It is clear, however, that high doses of cannabis, in some individuals, may produce effects somewhat similar to an attenuated LSD experience. While such effects are rarely reported, many milder aspects of the psychedelic experience regularly occur with a cannabis 'high'. The outline of potential reactions to psychedelic drugs presented in the Commission's *Interim Report*^{106,483} include: psychotic and non-psychotic adverse reactions, psychodynamic, cognitive, aesthetic, and psychedelic-peak

(transcendental) or religious experiences. While analogous experiences may occur in varying degrees with cannabis, the quality of the effects is reportedly different and, in general, the intensity of psychedelic effects is considerably lower and the overall response more controllable than with the more potent psychedelic drugs. It would be incorrect to say that cannabis in moderate doses actually produces a mild LSD experience; the effects of these two drugs are physiologically, behaviourally and subjectively quite distinct. Furthermore, since no cross-tolerance occurs between LSD and THC, the mechanism of action of the two drugs is thought to differ.^{297,631}

Although the altered state of consciousness produced by cannabis is undoubtedly multi-dimensional, as Tart has argued,⁵⁹⁸ there seems to be a common factor of 'highness' which can be reliably rated by subjects under certain laboratory and social situations. However, there is currently considerable controversy regarding the ability of even regular users to discriminate among different doses of cannabis and similar but inactive placebo material.^{111,298,303,397,399,400,431} While many of the subjective effects of cannabis are obviously difficult to quantify, subjects in Commission experiments were fairly efficient at differentiating the various doses on subjective indices and were not deceived for long by the placebo. Clear dose- and time-response effects were seen on a simple "highness" rating scale, and subjective measures correlated significantly with a number of objective behavioural and physiological variables. Some of the inconsistencies in the literature with respect to the reliability of subjects' phenomenological evaluations in the laboratory are probably due, at least in part, to the lack of standardized smoking techniques in most experiments.

The role of learning in the subjective effects of cannabis is perhaps most apparent in the phenomenon often referred to as a 'contact high'. Persons familiar with cannabis use may report feeling some of the milder subjective effects of the drug, without using it, when they are interacting with persons who are 'high'. Similar occurrences have been reported with other drugs, including alcohol.

A cannabis 'high' typically involves numerous phases. The initial effects are often somewhat stimulating and, in some individuals, may elicit mild tension or anxiety which is usually replaced by a pleasant feeling of well being. The later effects usually tend to make the user introspective and tranquil. Rapid mood changes often occur. A period of enormous hilarity may be followed by a contemplative silence. Many users report that they have some control over the degree to which they are involved in the subjective effects and that, when necessary, they can 'come down' and perform normally. Such a phenomenon may account for some of the discrepancies which exist between the substantial subjective changes that are often reported in the absence of significant objectively verifiable behavioural effects. The ability of subjects to 'come down' at will has not been adequately explored experimentally.

Subjective effects which are typically reported by users include: happiness, increased conviviality, a feeling of enhanced interpersonal rapport and communication, heightened sensitivity to humour, free play of the imagination, unusual cognitive and ideational associations, a sense of extraordinary reality, a tendency to notice aspects of the environment of

which one is normally unaware, enhanced visual imagery, altered sense of time in which minutes may seem like hours, changes in visually perceived spatial relations, enrichment of sensory experiences (subjective aspects of sound and taste perception are often particularly enhanced), increased personal understanding and religious insight, mild excitement and energy (or just the opposite), increased or decreased behavioural activity, increased or decreased verbal fluency and talkativeness, lessening of inhibitions and emotional control, and at higher doses, a tendency to lose or digress from a train of thought. Feelings of enhanced spontaneity and creativity are often described, although an alteration in creative performance is difficult to establish scientifically. While most experts agree that cannabis has little specific aphrodisiac (sex-stimulating) effect, many users report increased enjoyment of sex and other intimate human contact while under the influence of the drug.^{227,232,238,239,249,349,350,351,438,440,481,598}

Unpleasant experiences may occur in different individuals, or possibly in the same individual at different times, although significant acute adverse effects are relatively infrequent. Apparently most regular cannabis users have experienced some undesirable side effects from the drug.^{59,105,239,248,249,481,572,575,598} Some of these reactions may include: fear and anxiety, depression, irritability, nausea, headache, cold hands and feet, backache, dizziness, blurred vision, a dulling of attention, confusion, lethargy, and a sensation of heaviness, weakness and drowsiness. Disorientation, depersonalization, delusions, suspiciousness, paranoia and, in some cases, panic, loss of control, and acute psychotic and depressive reactions have also been reported. Schwarz has compiled an extensive catalogue of reports of negative effects which have at different times been attributed to cannabis in the literature.⁵⁴⁸ Adverse psychological reactions to cannabis are discussed in more detail in a separate section below.

Experimental Evidence of Sensory-Perceptual Effects

Attempts to objectively demonstrate in the laboratory the phenomenological experiences described by users have met with mixed success. Little research has been done using modern signal detection methods, and the majority of studies have focussed on rather gross sensory aspects of the perceptual phenomenon of ultimate interest.

At moderate doses, cannabis users often report a feeling of improved visual clarity and acuity. At high doses, some blurred vision and difficulty with focussing may be noted and, occasionally, users report decreased or intensified depth perception.⁵⁹⁸ Experimental attempts to demonstrate effects in visual acuity and depth perception have found no consistent change, however.^{134,455} In a Commission experiment there was a suggestion of decreased depth perception with the higher marijuana dose, but no effect was seen on general visual acuity.⁵¹⁸ Caldwell found no cannabis effects on brightness discrimination at apparently low doses.⁹⁸ These visual functions should be further explored utilizing signal detection techniques.²³⁶

In a pilot study which has received considerable publicity, Frank and associates suggested that visual recovery from bright-light glare was delayed by several seconds after marijuana smoking.¹⁹⁹ It was implied that this

increase in recovery time might increase the danger of night driving after cannabis use. However, later statistical analysis of the data showed no significant effect.²⁶³ Furthermore, in the same study, marijuana did not produce any change in illumination threshold. In another pilot study, these same investigators found no cannabis effects on simple dark adaptation.²⁶³ An exploratory study by the Commission using five subjects, run twice with a moderate dose of marijuana and twice on placebo, also found no statistically significant effect of marijuana on the recovery of dim-light visual acuity after bright-light glare.⁶⁰³ In addition, in a more comprehensive experiment using higher doses, Moskowitz found no cannabis effects on glare-recovery.⁴⁵⁵ Some cannabis users have reported a subjective sensation that visual after-images are retained for a longer period of time when 'high'.^{16,556} This effect might be explained by the general tendency of subjects to overestimate the passage of time after taking cannabis.

In a Commission experiment a significant improvement in two-flash fusion threshold (a measure of temporal acuity) was found one hour after subjects smoked cannabis.⁴⁴⁰ No change was seen in the Archimedes rotating spiral visual after-image test in this study. An enhancement of visual evoked cortical potential⁶¹¹ suggests some alteration in visual sensation with cannabis.

Almost uniformly reported by users are a variety of changes in eyes-closed visual imagery—even in persons who rarely experience the phenomenon normally. In Commission experiments, dose-dependent increases in vividness, clarity, colour, movement, depth and complexity of eyes-closed visual imagery were demonstrated.⁵⁵⁸ In a few instances at the higher dose, synesthesia was reported (some imagery contained qualities experienced through other senses as well). This phenomenological analysis confirms the view that cannabis produces visual imagery changes somewhat similar to those reported with mescaline and LSD.^{293,342,366,454,557} In rare instances, usually involving very high doses, eyes-open imagery or visual hallucinations may be seen with cannabis.³²⁴

Increased sensitivity to sound and greater appreciation of the subtleties of music are widely reported by cannabis users. While these subjective phenomena are not readily amenable to laboratory testing, simple sensory tests have found only minor and inconsistent changes in both directions in a variety of auditory differential discriminations and thresholds.^{98,134,461,670}

Cannabis users frequently report an increased sensitivity to, and awareness of, touch. While some investigators have found indication of enhanced sensation on certain measures,⁵²⁷ little or no change has been found in most laboratory experiments.⁵⁶⁴ Cannabis has been widely used in the past as a pain reducer. Its analgesic effects may not apply to all types of pain, however, and in some situations cannabis might even increase sensitivity to pain. In one continuing study, cannabis was found to be an effective analgesic.⁶³¹ Little systematic investigation has been done in this area, however. The analgesic effects of cannabis, alone and perhaps in conjunction with other analgesic drugs, may have considerable therapeutic potential and should be fully explored. In spite of common reports from cannabis users that taste sensations are greatly enhanced by the drug, in one laboratory experiment no

change was found in taste and olfactory sense.^{631,670} This is another area which has not been adequately explored.

Change in time perception is one of the most consistently reported features of the cannabis 'high'. Subjective time is almost invariably faster with the drug than without it, and cannabis usually results in an overestimate of the passage of clock time. Time production, rather than estimation, is less often affected.^{161,191} In some instances, subjects' estimates of clock time after marijuana are more accurate than with placebo, because of a normal tendency to underestimate time in certain conditions.²⁸² All of these various time perception effects have been corroborated on different measures in Commission experiments.^{440,603} Time perception effects may be related to changes in short-term memory or may reflect a general speeding up of an "internal clock".

Caldwell and associates report that one of the more sensitive objective indices of a marijuana 'high' is an increase in the *auto-kinetic effect*⁹⁶—a measure of apparent movement of a small stabilized light source in an otherwise dark environment. A similar increase in auto-kinesis was found in a Commission experiment. No consistent effect on the rod and frame test or other putative measures of field dependence have been reported in the literature.^{111,282,308}

INTELLECTUAL AND COGNITIVE EFFECTS

Cannabis temporarily alters a variety of intellectual and cognitive functions, and these changes are related to dose, past experience, and other psychological and social variables. Of the mental abilities so far tested, acute impairment is found more consistently with complex tasks than with simple ones, and with high doses rather than medium or low quantities. Although many profound changes in thought and perception are reported by users, few of these have been documented in the laboratory. The intellectual effects of acute cannabis use are rarely detectable by the casual observer, and experienced users generally have little trouble functioning socially without detection, even after relatively high doses. Users often report considerable improvement or expansion of certain psychological capacities from the drug, but such effects have generally not been adequately explored or documented scientifically.^{232,598} Cannabis users often report that when very 'high', they experience some trouble following a train of thought and may easily lose track of the direction of a conversation. Changes in speech patterns have been reported.⁶⁶⁰ Some users have also noted that when 'high' they tend to get lost while walking or driving more often than when not under the influence of the drug.^{275,438}

In spite of the rather profound short-term subjective psychological changes reported to occur with cannabis, the experimental literature is surprisingly inconsistent in reporting objectively documented changes in intellectual capacity or performance. Even a number of studies employing what would appear to be high doses have been inconsistent in detecting cannabis effects on standard tests of cognitive and intellectual functioning. Many of the tests employed are clearly not sensitive to, or appropriate for, the rather

amorphous psychological effects of cannabis. Consequently, both the positive and negative findings in the literature must be interpreted with caution.

Performance on complex tasks apparently requiring sustained attention and short-term memory are most often impaired in laboratory studies, although significant effects have also been found on simple tests at very high doses. Least effect is found with simple and familiar tasks, and those which the subject has had experience performing while 'high'. In a number of experiments, regular or chronic users performed better on standard doses than did novices or light users.^{305,407,431,660}

Tasks studied in the laboratory which have, in some situations, shown a cannabis-related impairment include: goal-directed arithmetic tasks, learning of a digit code and digit-symbol substitution, short-term or immediate memory tests, reading comprehension, and performance on cognitive and psychomotor tasks in the presence of distracting stimuli. Other studies have not found these effects. Simple memory tasks have given especially inconsistent results.^{4,111,133,161,209,282,308,397,407,431,612,660} Several recent laboratory studies suggest a dose-related impairment of attention and vigilance.^{111,133,431,455} Subjective reports from users confirm the notion that cannabis, in sufficient doses, often causes lapses in short-term memory and directed attention.

Mayor La Guardia's Committee investigated the effects of rather large doses of smoked and orally administered cannabis on intellectual functioning.⁴⁰⁷ Their data indicate that high doses impair a variety of mental abilities, while lower doses have little effect or may improve some of them. The conclusions that can be drawn are limited, however, by lack of statistical analyses of the data.

The research group of Melges, Tinklenberg, Hollister and others have studied certain aspects of THC-induced changes in short-term memory and temporal perception.^{426,427,611,612} Significant impairment was found on a goal-directed serial arithmetic task under some conditions, but not under others. This test is felt to assess short-term memory, attention and goal-directed organizing abilities, and an inability to perform properly was considered to reflect "temporal disintegration". With cannabis, subjects were shown to concentrate more on present thoughts and experiences than on aspects of the past or future. The researchers suggest that "temporal disintegration", seen at higher doses, can account for this phenomenon and may play a significant underlying role in a number of other cannabis effects, including depersonalization, a sense of timelessness, and perhaps acute psychotic or panic reactions. They also report that impairment in immediate memory with marijuana may be episodic and brief in duration, rather than following a smooth and continuous time course.

Waskow and associates found no decrement on the Wechsler Memory Scale at moderate doses of oral THC. Serial addition was affected only when a secondary distracting condition was presented concomitantly.⁶⁵⁵ Rafaelsen and co-workers reported that orally administered hashish produced a dose-dependent impairment on several psychological tests, which included the reproduction of sentences, learning finger labyrinths (mazes) and certain arithmetic abilities. Other tasks did not reveal significant effects.⁵¹⁴ Another

research group found that orally administered cannabis concentrate impaired reading comprehension and the learning of a digit code, and affected choice reaction time in a way which suggested a basic impairment in focussed attention and vigilance.¹³³

Recently an impairment in short-term memory was found in monkeys trained to smoke marijuana. The same effect was seen with orally administered THC. The monkeys exhibited some evidence of a “loss of ability or motivation to perform complex tasks”.^{542,680}

Abel has studied various aspects of marijuana effects on human memory processes and has described several mechanisms by which performance could be impaired.^{2,3,4} The drug might interfere with either acquisition of new material, storage of the information, or retrieval of stored material, or a combination of these. Abel gives evidence that retrieval mechanisms are not affected, but that acute intoxication with cannabis interferes primarily with acquisition processes involved in the storage of information—perhaps by reducing the focussing of attention required for adequate rehearsal of information for efficient memory storage. By contrast, Moskowitz’s recent work suggests that marijuana affects only the very initial acquisition of information, rather than its rehearsal or transmission to storage.⁴⁵⁵ Again, attention factors are suspected of playing a central role in this deficit.

The Commission has investigated the effects of marijuana and THC on several intellectual and cognitive abilities with drug doses commonly used in North America today.⁴⁴⁰ Short-term serial position memory was significantly impaired with the higher THC and marijuana doses, but not with lesser quantities. No significant drug effects were seen on the digit symbol substitution test, or on finger painting (rated on a variety of psychiatric, graphic and aesthetic dimensions) 1½ to 2 hours after smoking. Subjects rated themselves significantly lower on the Clyde Mood Scale “clearthinking” factor after cannabis use than with placebo. None of these effects was significant when the test battery was repeated 4½ hours after smoking.

In a separate Commission experiment, sustained attention was assessed in a 40-minute visual signal detection task which was subjectively boring and tedious, and made precise demands on the subject. Cannabis consistently reduced accuracy, and the decrement in performance (d') correlated positively with the individual’s subjective rating of the intensity of the drug-induced ‘high’.⁶⁰³ Similar effects have recently been found on an auditory signal detection task.⁴⁵⁵ In another Commission experiment, however, no cannabis effects were seen on a secondary choice-reaction task designed to assess attention and response speed.⁵¹⁸ The effects of cannabis on attention and vigilance should be further explored in a broader stimulus-and-reward context.

Cannabis users often claim enhanced creativity, and the ability to see new and significant relationships among sensory and cognitive experiences with the drug. The evidence in this regard is mixed.^{93,111,232,243,244,247,416,481,598,670} Such functions are extremely difficult to study scientifically. Creativity has not been adequately explored experimentally, even under non-drug conditions, and significant advances are not expected in the near future. While several studies have found that cannabis users tend to be more imaginative, flexible and

creative than average, the association between the use of the drug and these personality characteristics has not been shown to be a drug effect.

Certain combinations of dose, set and setting can induce severe acute panic or psychotic reactions. Clinical reports indicate that such temporary states are often characterized by extreme confusion, grossly impaired judgement and immediate memory, and a significant reduction in "reality testing". Adverse reactions of this type are examined extensively in a later section.

In the past few years a considerable number of surveys have examined the relationship between the use of cannabis and reported academic performance. In most of these studies, including the Commission's national survey of high school students,³⁵⁰ cannabis use tended to be associated with slightly poorer grades, with heavy users doing less well than others.^{20,21,54,103,247,269,299,464,569,572,586,591,666}

On the other hand, several studies have discovered no relationship between cannabis use and grades.^{60,275,494,504,650} In the Commission's national survey of university students there was no significant difference in the overall grade distributions of cannabis users and non-users.³⁵¹ Two college surveys in the United States have found that light or infrequent users had better academic records than either non-users or heavy users.^{233,277} A negative correlation between the use of cannabis and school performance seems to be more frequent in high schools than in universities. Canadian surveys have been more consistent than United States studies in linking poorer performance with drug use (and have generally shown less prevalent drug consumption). It is interesting to note that in most studies, the use of tobacco and alcohol reflects a similar, but sometimes weaker, negative relationship with academic performance.

No causal inferences can be drawn from these correlational studies. Campbell, however, has suggested that the prolonged and heavy use of cannabis can lead to a temporary deterioration of the capacity to abstract and synthesize, and such a deficiency would likely be reflected in academic performance.¹⁰³ This hypothesis should be systematically explored.

A number of other recent clinical and interview reports also suggest that some cognitive impairment may be associated with chronic cannabis use by some persons in North America.^{83,177,334,345,383,448,511,682} Problems of thinking, attention, concentration and memory were noted in several instances. A tendency for some "excessive" users "to favour regressive and magical to rational thinking" has been reported.⁶⁷⁸ Schwarz has drawn attention to a parallel between the short-term effects of cannabis on cognitive functioning and some alleged chronic effects. He is of the opinion that, "Despite the persistence of acute toxic features in some people, in a majority of cases the effects wear off in a comparatively short period of time after drug intake is stopped."⁵⁵⁰ [P. 12]

Very little controlled research has been done on the effects of chronic or sub-chronic cannabis use on cognitive functioning. The 1946 study by Williams and associates suggests a slight reduction in performance on an I.Q. test and no change in rote-memory over a period of more than one month of heavy daily use,⁶⁷⁰ but the interpretation of the experiment is hampered by the lack of both a control group and statistical analysis of the data. Miles and associates, at the Addiction Research Foundation of Ontario, are

investigating the effects of daily marijuana smoking (at various doses) in the laboratory for periods of up to two months.⁴³⁶ Matched control subjects were examined under identical conditions. No significant chronic changes in intellectual functioning due to marijuana have been detected in these studies. (A preliminary summary of this continuing experimental program is presented in Annex B at the end of this chapter.)

Recently in a preliminary study, Dornbush has found tentative evidence of some recovery from initial drug-induced cognitive impairment when subjects were administered a fixed marijuana dose daily for a few weeks.¹⁶⁰ By contrast, Hollister has found no change in drug effects over a five-day period of daily oral THC administration.²⁸¹ Several other experimental studies which are presently in progress should add significantly to the information in this area.^{428,626}

In Jamaica, Bowman examined a total of 30 males with a 10-year or longer history of steady use of cannabis, and 24 matched non-users. These groups were not consistently different on a wide variety of measures of cognitive function and memory.⁷⁴ The United States NIMH has sponsored a large-scale study of a broad range of psychological, social and physiological measures in cannabis users in Jamaica, but the results of the investigation have not yet been made public.⁵³⁴ A continuing study of chronic hashish smokers in Greece will also be interesting in this respect.¹⁸⁹ So far, no gross abnormalities have been found. In Egypt, Soueif has compared 850 persons imprisoned for cannabis use with prisoners who had never taken cannabis, opium or other illegal drugs. The drug users performed less well on most of the cognitive tests.^{584,414}

After a general inquiry, in 1893 the Indian Hemp Drugs Commission came to the conclusion that "...the moderate use of hemp drugs produces no injurious effects on the mind...." But, "It is otherwise with excessive use." The Commissioners stressed, however, that moderate use is the rule "...and that the excessive use is comparatively exceptional."²⁹⁵ [P. 264]

Mayor La Guardia's Committee examined 48 users in New York who had been smoking regularly for two to seventeen years. The Committee concluded that:

There is definite evidence in this study that the marijuana users were not inferior in intelligence to the general population and that they had suffered no mental or physical deterioration as a result of their use of the drug.⁴⁰⁷ [P. 141]

There have been reports from the East that certain long-term heavy cannabis users, who apparently constitute a group not unlike North American skid-row alcoholics, show a progressive deterioration in intellectual ability. We have been unable to find evidence of such long-term effects in the Western literature. Eastern and other literature concerning acute and long-term effects on cognitive functioning of this character is considered in greater detail in the section on adverse reactions.

PSYCHOMOTOR PERFORMANCE AND DRIVING

Psychomotor Performance

The effects of cannabis on psychomotor skills depends upon dose, the subject's past history of use (and probably his experience with the task while 'high') and the nature of the sensory, cognitive and muscular components involved in the task studied. The "set and setting" are also undoubtedly important, as well, but have not been adequately studied in this context.

Mayor La Guardia's Committee found that apparently large doses of oral or smoked cannabis impaired hand and body steadiness and choice reaction time. Simple reaction time and maximum tapping speed were little affected. The decrements were generally dose-related, and persons with past cannabis experience showed less impairment in performance than did those who had not taken cannabis before.⁴⁰⁷ The findings of decreased hand and body steadiness and impaired complex reaction time have been recently confirmed, as well as the observation that experience with the drug may reduce or eliminate the impairment.^{133,305,337} There is some suggestion that cannabis may slightly alter ocular-motor (eye movement) function,⁴⁵⁵ although the general significance of such an effect is unclear.

More complicated psychomotor skills, requiring an integration of continuously changing visual and muscular feedback and motor control have recently been studied. Weil and co-workers tested cannabis-naive subjects with two different doses of smoked marijuana and an inactive placebo. Performance on a task requiring muscular co-ordination and attention (Pursuit Rotor Test) declined as dose increased. No effect was seen with the high dose in a small group of experienced cannabis users.⁶⁶¹ Carlin and associates found no significant cannabis effects in experienced cannabis smokers on pursuit rotor performance, either while the task was being learned, or after the subjects' tracking abilities had improved and stabilized with practice.¹¹¹ Manno and associates found a dose-dependent impairment of pursuit tracking performance in a group which included both experienced and cannabis-naive individuals. A tracking impairment due to cannabis was demonstrated in three separate studies, although a dose-dependent relationship was evident only when the drug was administered on a body weight basis. Marijuana and alcohol together produced significantly greater impairment of tracking performance on one of the four stimulus patterns tested than did either drug alone. There is some suggestion that boredom and attentional factors played a significant role in these deficits.^{337,397,398,399,400}

Crancer's group found no cannabis effects on a laboratory-simulated driving task.¹⁴⁵ This study will be discussed in more detail below. Similarly, a recent study in Alberta found no marijuana-related impairment on a "pilot simulator" laboratory apparatus designed to assess "muscular complex co-ordination" skills.⁵⁶⁴ Rafaelsen and associates, in a preliminary report of their cannabis and alcohol driving simulator research, noted no drug effects on "start time", but both drugs increased "brake time".⁵¹⁵ Again, attention problems were implicated in the brake time delays. Binder reported that marijuana increased response latency in a laboratory tracking task.⁵⁵

The Commission has investigated the effects of various doses of high purity THC, marijuana and alcohol on several psychomotor abilities in experienced users of these drugs.^{251,440,518} Both the upper cannabis and alcohol (.07% blood alcohol level—b.a.l.) doses produced subjective effects reported to be generally comparable to those typically experienced when 'high' or 'stoned'. (Although most subjects felt that the dose produced effects that were at least as intensive as their normal experience with the drug, others reported that they felt less 'high' than usual.) Simple tracking and complex tracking (involving the addition of a foot choice-reaction task and occasional polarity reversals in the control device), tapping speed, and some automobile driving tasks were studied. The driving data will be discussed separately below.

Maximum tapping speed was unaffected by cannabis.⁴⁴⁰ In the first hour after drug administration, alcohol and, less consistently, the upper marijuana dose resulted in a decrease in simple and complex compensatory tracking performance.⁵¹⁸ The interaction of low marijuana and low alcohol (.03% b.a.l.) in combination typically resulted in more error in complex tracking than either low dose treatment alone. An additive drug effect was not as evident in simple tracking. A more detailed analysis of the various components of tracking error (discussed in Annex A of this chapter) suggests that the mechanisms of the effects of marijuana and alcohol on this task are somewhat distinct. Speed of reaction to tracking control polarity change tended to be slower with the higher dose of alcohol, but not with the other drug conditions. During complex tracking, whenever a number appeared on an electronic tube positioned above the tracking screen, the subject was required to push either a left or right pedal, or continue pushing a middle pedal with his foot, depending on which of three numbers was presented. No warning signal was given. This task was designed to assess both secondary attention and response time. Marijuana did not significantly change choice-reaction time, but alcohol reliably decreased response speed. The drugs did not cause subjects to miss signals or respond at the wrong time any more often than with placebo, suggesting no drug effects on the level of attention required to perform this task. The effects of low alcohol and marijuana in combination on choice-reaction were not significantly different from the effects of alcohol alone. No reliable drug effects were seen on psychomotor performance when the subjects were retested four hours after smoking. The additive decremental effects of alcohol and cannabis on psychomotor performance suggested in this study and by Manno and associates³⁹⁹ may be of social importance because of the increased use of these drugs in combination.

The effects of long-term chronic use of cannabis on psychomotor functioning has not been adequately explored. In William's study, subjects smoked large quantities of marijuana daily for more than one month. No gross effects were noted on muscular co-ordination, although on one test of mechanical ability there was a tendency for increased speed but less accuracy as time went on.⁶⁷⁰ The lack of a control group and statistical analysis limits the conclusions that can be drawn from this study, however. In a report of a prison study in Egypt, Souief found a tendency for inmates arrested for hashish use to perform less well on psychomotor tests than did prisoners who had never taken any illicit drugs (1,689 subjects were tested).^{584,414} In two

studies of chronic heavy marijuana users and matched controls in Jamaica, Bowman found no evidence of significant psychomotor impairment.⁷⁴ Other studies of chronic and sub-chronic use are underway which may be of value here, but the relevant data have not yet been presented.^{160,189,281,428,534}

Automobile Driving

Although there are clearly a multitude of valid reasons for interest in the effects of cannabis on psychomotor skills, concern has perhaps been greatest for possible adverse effects on automobile driving. While laboratory studies of psychomotor skills and attention are of considerable interest in this regard, the predictive validity of such tests with respect to actual driving has not been demonstrated, and generalizations must be made with great caution.

Compared to most behavioural tasks studied in the laboratory, automobile driving is an extremely complex phenomenon. Certain isolated elements of the overall behavioural patterns involved have been explored, and some are reasonably well understood in abstract experimental conditions. However, the relative importance of various perceptual, cognitive and psychomotor responses in general driving and (of greater significance ultimately) in traffic accidents and fatalities is not clear. Although it would seem obvious that gross impairment in any of a number of essential functions would affect driving ability, little is known as to the actual causes of traffic accidents, and small defects in one or more components might not result in significantly increased accidents or injuries.

Many popular assumptions as to essential driving skills, which may on the surface seem valid, have not been supported by studies of driving behaviour. It has been shown that bad drivers (i.e., those with a large number of moving violations) actually had faster reaction times, performed better on a number of visual perception tasks, and were more knowledgeable about traffic laws than individuals with better driving records.^{144,654} Fergenson found that drivers with high accident rates were slower in a choice-reaction time test than non-accident drivers, but those with many traffic violations and no accidents performed best.¹⁸⁴ Currie has argued that elementary psychomotor functions, like simple reaction time, are generally not significant factors in accidents, but that judgemental faculties such as the perception of danger are more important.¹⁴⁷ It would seem that such factors as driver attitudes, risk-taking traits, general judgement, attention and susceptibility to distraction, and a variety of other variables which are very difficult to measure under natural conditions, may be more significant in contributing to automobile accidents. Waller stresses that both laboratory and epidemiological data are needed in this area.⁶⁴⁸ Non-experimental information of value can be gained from studies of users' attitudes, experiences and driving records, and by systematic investigation of accidents. Data in these various areas will be discussed below.

Hypothetically, there are many ways in which a drug might change some component of the driver's car handling or traffic negotiation abilities. A drug might, for instance, damage his ability to assess risks, or to integrate the complex feedback involved in car handling. It could subtly impair the driver's psychomotor co-ordination or simply make him fall asleep. The drug could

alter his perception of the roadway or change the way he evaluates the intentions of other drivers, or it might perhaps interact with a particular situation in the environment, regardless of the driver's skill and motivation. A drug could very well have drastic, disabling effects on driving ability and yet have little effect on accident rates if people tended not to drive after using the drug. A drug could have an effect on driving and accidents, but cause few injuries, perhaps because it would induce its users to drive more slowly and thus be involved mostly in minor accidents. (Driving slowly, however, may cause difficulties for others in fast-moving traffic.) A drug might have no effect on psychomotor functions, yet increase risk-taking or aggressiveness in a way which leads to a greater incidence of accidents and injuries.

As noted above, cannabis has a variety of perceptual, cognitive and psychomotor effects which are dose-dependent. General psychomotor skills, such as tracking ability, complex reaction time, etc., may be only slightly or not at all impaired at low doses, while higher doses often produce a more definite effect. It has been shown that cannabis can affect attention and judgement, and, if the dose is sufficiently large, can produce considerable perceptual distortion. On the other hand, cannabis does not normally seem to increase aggression and apparently often reduces it. In all, it would seem likely that under some conditions, cannabis might have adverse effects on driving, and that any such effects would vary as a function of dose and a variety of other factors.

Attitudes of Users Towards Driving

A number of surveys of regular cannabis users indicate that at least half have driven while under the influence of cannabis.^{239,248,251,275,415,481} A significant proportion of these persons feel that their driving is impaired by the drug, and many generally refuse to drive after using cannabis. Others deny any impairment. Many indicate that they compensate for initial difficulties and, in fact, are more careful and, consequently, safer drivers when 'high'. It has even been suggested that because of the tranquilizing effects attributed to cannabis, low doses might improve driving performance in some nervous individuals under certain conditions of tension or stress. Other observers have expressed concern over the possible effects on driving of "flashbacks" or recurrences of intoxication effects in the absence of recent drug use.

Klein and associates studied college students' attitudes to cannabis and driving, and found that infrequent and former users tended to downgrade their driving-related perceptual and psychomotor abilities with marijuana more frequently than did chronic users. In addition, non-users and infrequent users tended to disapprove of the use of marijuana by airplane pilots and commercial and private automobile drivers more consistently than did chronic users.³⁴⁰ Whether these attitudes reflect a differential sensitivity to marijuana effects, possibly including tolerance, or perhaps some attempt at rationalization by chronic users, or other biasing factors (either positive or negative) is not clear. The authors also presented a series of case history examples where marijuana use was allegedly involved in crashes or poor driving.

Experimental Studies of Driving Skills

Experiments of drug effects on certain driving tasks, or on simulated or putative components of actual driving behaviour, may answer certain specific questions regarding cause and effect in the experimental context, but they generally lack documented predictive validity with respect to performance under normal conditions of driving. In any experimental research on driving, of either the laboratory driving-simulator or driving-course type, some components of 'real' driving will be absent. In most laboratory simulator tests there are simulated demands on both the car handling and traffic negotiation functions, but actual vehicle control is lacking and many of the normal lines of feedback to the driver do not exist. In a simulator, the driver generally only uses vision (and perhaps hearing), while in real driving he receives feedback through his bodily senses (kinesthetic and vestibular) as to the consequences of his control movements. When automobiles are used in a controlled driving course, the driver receives normal feedback on performance, since he is handling a real car, but he does not have to cope with traffic or dangerous situations. Drug effects on real traffic negotiation are rarely studied for safety reasons. In either kind of test, the risks and payoffs involved are quite different than in normal driving, and in most experimental tests there is no risk in poor performance at all, except perhaps to the subject's self-esteem. On the other hand, subjects are always aware that they are "performing" and under observation. In most testing of driver behaviour there is a limited and arbitrary choice of roadway and vehicle characteristics, so that interactions of driver factors with different aspects of the roadway and vehicle, which may be of the most interest, are not seen. The problem of validating any experimental tests against driving performance under normal conditions has not yet been solved, and the relative value of laboratory simulator and test-track driving measures is a matter of dispute.

In 1969 Crancer and co-workers from the Washington State Department of Motor Vehicles published a study of marijuana effects on a laboratory driving simulator.¹⁴⁵ Scores on a very similar task had previously been shown to correlate slightly with subjects' driving records. The overall performance of 36 regular cannabis users tested with a single dose of marijuana was not different from control, although there was less careful monitoring of the speedometer under the drug, and "driving" tended to be slower.¹⁴⁴ The main study was followed by two cursory investigations. Four subjects were retested with approximately three times the original dose and none showed a significant change in performance. Furthermore, four marijuana-naive subjects were tested after smoking enough marijuana to become 'high' (equal to or greater than the amount used in the main experiment). No significant change in scores occurred with the drug in these subjects either.

The investigators cautioned that the study does not necessarily indicate that marijuana will not impair driving:

However, we feel that, because the simulator task is a less complex but related task, deterioration in simulator performance implies deterioration in actual driving performance. We are less willing to assume that non-deterioration in simulator performance implies non-deterioration in actual driving.¹⁴⁵ [P. 854]

In order to obtain some standard reference point for the study, and to ascertain the sensitivity of the performance task to known drug-induced impairment, the subjects were also tested under a single dose of alcohol, designed to produce a blood alcohol level (b.a.l.) corresponding to the legal standard of presumed driving impairment in Washington (0.10% b.a.l.). The actual b.a.l. achieved was 0.11%, a relatively high dose.¹⁴⁴ The average number of errors under alcohol was significantly greater than that acquired under either the no-drug or marijuana conditions. The Crancer study has been widely quoted and distorted in the literature and is often referenced to demonstrate that marijuana does not affect driving—a conclusion not drawn by the original investigators.

H. Kalant has pointed out that comparisons between the drugs must be made with caution due to the single doses used in the main study.³¹⁰ He also suggested that, even though it would not have been easy for the subjects to fake good driving performance under marijuana, an anti-alcohol bias, sometimes seen in marijuana users, could have resulted in poorer performance in the alcohol condition. The study has also been criticized for comparing a heavy alcohol dose with a mild cannabis dose. However, Crancer apparently gave rather large quantities of marijuana, although the actual potency of the material used is in question. In another laboratory, marijuana from the same supply was found to be much weaker than originally estimated.⁵²⁷

As noted earlier, Rafaelsen's group found that "socially relevant" doses of cannabis taken orally increased "brake time" (and apparently the number of missed signals) but had no effect on "start time" in response to the appropriate driving signals in their laboratory driving simulator.⁵¹⁵ The U.C.L.A. group has released very little information about their driving-simulator research, but has suggested impairment due to marijuana in some other apparently driving-related tasks.^{455,631} Other general studies of psychomotor skills of possible relevance to driving have been discussed above.

The Commission has conducted an initial investigation of the effects of two levels of smoked marijuana and a single dose of alcohol on a limited range of automobile driving tasks in 16 regular users of both drugs.²⁵¹ Subjects' ratings indicated that the upper cannabis dose and the alcohol (.07% b.a.l.) generally produced effects comparable to their typical levels of "highness" or intoxication achieved with these drugs. Subjects were tested under all conditions and received first a drink and then a smoke in each session, one of which was a placebo on experimental drug days. In the control session, the subjects were given a disguised non-alcoholic drink and a "joint" of thoroughly extracted marijuana placebo. Subjects were tested for three-quarters of an hour on a driving course (marked out with wooden poles and plastic cones) on which they were required to perform a number of manoeuvring and parking tasks requiring good psychomotor control and judgement. Six consecutive laps of the 1.1 mile track were completed on the first test trial. Three hours after smoking, subjects were tested again on half as many laps.

The low marijuana dose and placebo conditions were not different in terms of the number of poles or "road cones" hit. Both the higher marijuana dose

and the alcohol condition produced small increases in "hits", which were reliably different from placebo, but not significantly different from each other. The higher cannabis dose resulted in a slight (7%) but consistent decrease in driving speed. This latter effect is in agreement with other less formal data.^{144,340} Driving speeds in the other drug conditions were not significantly different from those of the placebo conditions. Efficiency of handling was noted by a within-car observer. Awkward or superfluous driving manoeuvres ("rough handling") tended to be greater under both drug conditions, but only the alcohol scores were significant. No substantial drug effects on the driving measures were detected on the second trial three hours after drug administration.

Thirteen of the 16 subjects were experienced in driving in normal traffic after smoking cannabis or drinking alcohol, while three had never done so. Of the 13 experienced subjects, all but one reported having driven when feeling at least as "high" as they felt when getting the lower cannabis dose, while seven reported having driven when feeling at least as "high" as they did after getting the higher cannabis dose. Eleven of the 13 subjects had driven when feeling as "high" as they felt after the alcohol dose. In both the alcohol and upper cannabis conditions, the subjects rated their driving ability as lower than they did after placebo. Moreover, they felt that driving took more effort after either drug, and that normally they would be less likely to drive when feeling as they did.

Faking poor performance under the alcohol condition seems unlikely in the present study. To begin with, subjects' attitudes were carefully explored in interviews; none displayed any sign of hostility towards alcohol, and all were intermittent drinkers. Furthermore, some subjects thought they were receiving both drugs in the alcohol or high-dose marijuana conditions. In addition, the alcohol impairment among the marijuana users on these tasks was comparable to that displayed by a similar group of 12 non-marijuana-using alcohol subjects in a secondary study, in which cannabis was not mentioned.

Considerably more experimental work is needed to elucidate the exact nature of the effects of cannabis on driving skills, including the examination of a variety of other performance and risk measures, as well as dose-response and drug-interaction effects (especially with alcohol). Important questions regarding high-speed freeway decisions and manoeuvring, for example, as well as susceptibility to distraction and reaction to unexpected events under conditions of relaxation, stress, fatigue, or boring long-distance driving should be explored. Some of these conditions are not easily amenable to controlled experimentation. On the basis of the Commission study, one cannot assert that cannabis does or will cause automobile accidents or the contrary. It does demonstrate, however, that marijuana, in acute doses within the range commonly consumed by some individuals in North America today, can produce measurable impairment of short duration in some driving tasks which are, in some respects, not unlike the effects of alcohol in quantities commonly used. More specific comparisons of the effects of these drugs on driving cannot be made on the basis of these data. Additional investigation is clearly indicated.

Previous claims that cannabis has no effect on driving skills (based largely on a misinterpretation of Crancer's work), and poorly supported statements that experienced cannabis users can "come down", and completely control, or compensate for all the effects of the drug when necessary must clearly be modified.⁶⁵⁸ On the other hand, there is no evidence from available experiments for the notion that social cannabis use produces a disastrous loss of judgement or psychomotor control. Our research suggests that until further data are available, driving while under the influence of cannabis should be avoided.

As described in an earlier section, a pilot study which suggested that cannabis might increase visual glare-recovery time by several seconds received wide publicity.¹⁹⁹ Considerable concern has been expressed that night-time driving problems might be caused by such a sensory effect. However, the trend reported in the original report was not statistically significant. An investigation by the Commission of the effects of cannabis on recovery of dim-light visual acuity after bright glare⁶⁰³ and a more comprehensive study by Moskowitz⁴⁵⁵ have also failed to find any major changes. To date, no adverse effects of cannabis on visual glare-recovery, after-image retention, or dark-adaptation time have been demonstrated.

Driving Records

Waller has stressed that tests under experimental or laboratory conditions alone can give no definitive conclusions regarding highway crashes.⁶⁴⁸ Epidemiological data regarding actual driving conditions is needed as well. There have been several studies of the driving histories of identified marijuana users. McGlothlin and associates investigated the records of marijuana users who volunteered for an LSD experiment and found them to have traffic violation and accident rates which were not significantly greater than non-users.⁴¹⁵ Klein's group found that chronic cannabis users admitted to more frequent traffic violation charges than non-users,³⁴⁰ but it was not ascertained whether or not these occurred while under the influence of the drug. In Haines and Green's study, none of 81 regular users who had driven when "high" (many of them regularly) "...has ever incurred physical harm or has been involved in an auto accident when stoned".²⁴⁸ Crancer and Quiring found arrested male marijuana users to have more traffic violations and accidents than a control group, while in the marijuana arrestees as a whole (including females) the violation rates were not significantly elevated.¹⁴⁶ As the authors point out, arrested users are not representative of the general population of users in society and there is no way of determining whether or not the excess accidents occurred while the users were under the influence of the drug. Even within the group studied, the reasons for deviant driving are unclear. The authors state, "The most obvious causes of a poorer driving record might be increased driving exposure, physiological impairment from using drugs, and character disorder."

Several other studies strongly suggest that personality and social factors may account for poor driving records.¹⁷¹ Waller investigated the driving records of 231 persons convicted for illegal drug use (usually cannabis) in California, and found the group to have more documented traffic law

violations, but no more accidents than other drivers. Many of these delinquent drivers began "illegal drug use... only *after* they were already known as 'negligent operators'." Consequently, drug use was probably not a cause of the violations, but more likely reflected a general tendency to take risks and ignore the law.⁶⁴⁶ The author later concluded that, with other factors controlled, marijuana use alone was probably not related to excessive crash risk.⁶⁴⁷

For maximum gain, future investigations of driving records should take into account such variables as age, sex and social characteristics of the subjects, pre-drug-use behaviour and personality, the frequency of cannabis and other drug use, overall driving exposure (both with the drug and without it), and the presence or absence of intoxication or drug-induced impairment at the time of the violation or accident of interest.

Accident Investigations

Several anecdotal reports, case histories or other stories implying marijuana involvement in accidents or poor driving have appeared in the literature.^{57,93,340,663} The significance of even verified isolated reports is difficult to ascertain. Waller points out in his recent review of drugs and driving:

Anecdotes or individual case histories can suggest relationships and mechanisms in specific instances. They can give no indications, however, as to the frequency with which relationships exist. The event described may be commonplace or quite rare.⁶⁴⁸ [P. 1479]

Unfortunately, due to the lack of convenient and reliable chemical techniques for quantifying or even detecting cannabinoids in body fluid or tissues, it has not yet been possible to objectively compare the occurrence of cannabis use in drivers who have had accidents with those who have not. Such controlled surveys of fatal and non-fatal accidents, and of drivers both "at fault" and "victims", have been of major importance, for example, in clarifying the role of alcohol in traffic accidents (see Borkenstein's work⁶⁴). Similar studies focussed on the detection of cannabis and other drugs, as well as alcohol, in persons involved in accidents, should be initiated once the appropriate biochemical tests have been developed for cannabinoids. Recent advances in detecting cannabinoid metabolites in the urine may provide some qualitative assistance in this area.

In order for epidemiological studies of this type to yield reliable information about a drug's potential traffic hazards, the incidence of the use of the drug in the driver population must be fairly substantial. Such investigations are clearly not sensitive to driving conditions which are relatively infrequent at the time of the study. It would appear that in most parts of Canada the present coincidence of cannabis use and automobile driving in the general population is probably too low for the detection of possible cannabis-related traffic hazards using this research technique. Such studies might be feasible in parts of British Columbia or California, for example, or in other areas or countries where regular cannabis use is quite common.

Conclusions Regarding Traffic Hazards

In his 1971 review of the literature, Waller cautiously concludes that the use of marijuana may not be associated with a substantial increase in crash risk.⁶⁴⁸ Similarly, Nichols, in a major review of the broad area of drugs and highway safety prepared for the United States Department of Transport in 1971, concluded that the existing data do not confirm the hypothesis that drug use (other than alcohol) is presently a major factor contributing to highway crashes and fatalities.⁴⁷⁴ Both investigators stress that important gaps exist in our present knowledge, and that no definite statement can be made at the present time regarding the possible role of cannabis in accidents.

While Commission experimental findings do not invalidate the guarded conclusions of Nichols and Waller, both the demonstration of some, even limited, driving impairment due to cannabis, and the evidence suggesting that cannabis and alcohol have additive detrimental effects on certain psychomotor skills, indicate that a cautious approach should be taken in interpreting the present, very limited epidemiological data regarding cannabis and traffic accidents. Continuing changes in the frequency and patterns of use of cannabis (and other drugs, including alcohol), in addition to improved research techniques, may substantially alter the epidemiological picture in the future. These changes must be carefully monitored and documented.

ADVERSE PSYCHOLOGICAL REACTIONS

ADVERSE REACTIONS

The term *adverse reaction*, as traditionally applied to the medical use of drugs, refers to significant undesirable or negative side-effects of the drug. The distinction between main or desired effects and the multitude of other side effects which the drug may have is not absolute in any sense, and the application of these terms generally depends on the conditions of drug use. In the medical use of drugs, the desired and undesired effects are relatively easy to define in a specific treatment context, although the labels may change with the aims of the therapy.

Drug adverse reactions in the medical context are not at all unusual. In one recent study in Montreal, a total of 524 psychiatric patients experienced 730 adverse reactions to psychotropic drugs administered them for therapeutic purposes.³⁵⁵ This represents an overall incidence of close to 10% of the more than 5,000 patients studied over a one-year period. Predominant adverse reactions included central nervous system effects, behavioural effects and autonomic physiological effects.

In the area of the non-medical use of drugs, defining adverse reactions becomes considerably more complicated. With cannabis, for example, personal and social attitudes and norms often dominate in the interpretation of drug effects. What may be a desirable or pleasurable effect to one individual in a certain situation may be considered an adverse response or a side effect in another situation or to another individual. For example,

cannabis effects that are subjectively considered “psychedelic” or “peak” by certain persons are often defined as “psychotic” by others. Feelings of increased sensitivity to humour, reported by some users, may be viewed as “unnatural hilarity” or “loquacious euphoria” by other individuals. What some would consider “exploration of inner consciousness” might alternatively be called “escape from reality”. Clearly, the labelling of certain aspects of a drug experience as adverse, neutral or positive is often a function of individual and social constructs and concepts of normality, morality and reality, and generally implies a definite value judgement beyond the objective reporting of behaviour and experience.²³² In a survey of physicians regarding adverse reactions to LSD, one respondent stated, “From my understanding of the effects, I would consider *all* reactions to LSD as ‘adverse’ regardless of the immediate subjective response.”⁶²⁵ Clearly, not all LSD users or other observers share this opinion. As Bialos indicates, in discussing some of the difficulties with defining marijuana adverse reactions:

...drug users, the non-drug user friend, the professional clinical observer, the researcher, the law enforcement official, and the middle-aged, middle-class citizen may all have different criteria for defining the syndrome.⁵² [P. 819]

Tart has proposed two criteria for selecting what he believes would be unequivocally negative effects:

- (1) The effect is clearly unpleasant,
- (2) it has no redeeming value, other than as a possible lesson to the user.⁵⁹⁸

While most observers might agree in principle with the approach, considerable conflict among individuals would undoubtedly arise in the application of these criteria in many practical situations.

Even if agreement is reached as to whether a particular drug-associated condition is positive or negative, in practice one is often left with the difficult task of determining whether the behaviour or condition under consideration is in fact a response to the drug, whether the drug use is the result of the condition, whether the two are merely randomly coincident, or if a combination or interaction of these possible situations might exist. Some observers contend that only those with serious psychiatric disorders become heavily involved in non-medical drug use, while others might argue from the same data that the drug is primarily responsible for the pathology. Alternatively, some investigators have suggested that the “cannabis psychosis” often noted in Eastern literature, for example, is merely endogenous schizophrenia occurring in the drug-using population, independent of drug use.

In spite of these ambiguities, a number of rather specific concerns have developed regarding possible adverse psychological reactions to cannabis. Some of these alleged effects, which will be examined in detail below, include acute adverse reactions such as depression, anxiety, panic or psychotic-like, short-term responses; cannabis augmentation of pre-existing neuroses, character disorders and adjustment problems; functional psychoses, in which cannabis might serve as a precipitating or complicating factor; long-term changes in personality, behaviour or life style associated with chronic use (for example, the so-called “amotivational syndrome”); a specific “cannabis

psychosis” or dementia of a chronic nature caused primarily by the drug; and “flashbacks” or recurrences of previous drug effects.

Because of the potentially serious nature of these alleged acute or chronic effects and the current vociferous controversy regarding both the validity and frequency of such occurrences, the literature concerning adverse reaction will be reviewed in considerable detail below.

ADVERSE PSYCHOLOGICAL REACTIONS TO CANNABIS IN THE EAST AND IN NON-INDUSTRIAL COUNTRIES

A vast literature exists describing complications of chronic cannabis use in the Middle and Far East, where the drug has been consumed for centuries. Generally, moderate use seems to be the rule, with little evidence of harmful effects in the majority of users. However, cannabis has long been implicated in serious psychiatric problems in some chronic heavy users, who reportedly constitute a population similar to the derelict skid-row alcoholics of this continent. There are a variety of problems with interpreting these reports and generalizing their conclusions to North American conditions of cannabis use. It has often been said that many of these countries are underdeveloped scientifically and medically as well as economically. Consequently, few studies exist which are even marginally adequate by present scientific standards of clinical research. As discussed earlier, medical and psychiatric diagnostic and treatment practices vary greatly from country to country. In addition, in most non-industrial countries, psychiatric institutions are grossly understaffed and suffer from a serious lack of modern treatment and diagnostic facilities. The majority of subjects in most of the Eastern studies were illiterate, impoverished and malnourished. Furthermore, the potency, form, and mode of administration of cannabis (and the presence of other psychotropic drugs), as well as the extent, patterns of use and social and religious meaning, differ greatly from conditions in North America.

The 1971 United States Health, Education, and Welfare *Marihuana and Health* report states that:

In evaluating the significance of overseas studies of the relationship of cannabis use to mental deterioration, it is important to recognize the comparatively low level of attention that can be paid to psychiatric illnesses and to the fate of the mentally ill in countries where life for the bulk of the population is one of marginal survival and there are more pressing public health problems. Here crippling chronic illnesses long since eliminated in the West are still endemic, and mental hospitals and trained psychiatrists do not rank high on the list of national health priorities. Yet some of the most widely quoted studies in the literature on marihuana and psychosis have originated from poorly staffed and maintained psychiatric hospitals, operating with a minimum of professionally trained psychiatrists.⁶³¹ [P. 124]

In spite of these limitations, certain studies clearly merit attention and may provide clues as to possible consequences of increasing cannabis use and of changing patterns of consumption in the West.

A number of articles in the nineteenth century and early part of the twentieth, reported that cannabis was responsible for 20 to 50 per cent of the

mental hospital admissions in India, Egypt and other Eastern and Middle Eastern countries.^{121,173,652} A different picture has been presented by other researchers.

The Government of India, in 1893, appointed the Indian Hemp Drugs Commission to investigate and report on the economic, social and medical aspects of the cannabis (hemp drugs) situation in India.²⁹⁵ The different forms of the drug, *bhang*, *ganja* and *charas* (hashish), were to be studied separately. The Commission was asked to "...ascertain whether, and in what form, the consumption of the drugs is either harmless or even beneficial as has occasionally been maintained." Although the inquiry, in many respects, does not meet modern optimal research standards, it remains one of the most thorough general studies of cannabis ever conducted.^{313,320,433}

In investigating the effects of hemp on mental health, the Indian Hemp Drugs Commission found much of the medical testimony and hospital records and reports defective and unreliable. In many instances, the primary hospital data regarding the patients' histories and diagnoses were taken from the "descriptive role" which was generally filled out prior to referral to the asylum, often by non-medical personnel such as policemen or magistrates. The Commission stated:

It may well seem extraordinary that statistics based on such absolutely untrustworthy material should have been submitted year after year in the asylum reports. It is extraordinary and cannot be fully justified. [P. 236]

The Commission concluded:

In respect to the alleged mental effects of the drugs, the Commission have come to the conclusion that the moderate use of hemp drugs produces no injurious effects on the mind....It is otherwise with excessive use. Excessive use indicates and intensifies mental instability....It appears that excessive use of hemp drugs may, especially in cases where there is any weakness or hereditary predisposition, induce insanity. It has been shown that the effect of hemp drugs in this respect has hitherto been greatly exaggerated, but that they do sometimes produce insanity seems beyond question....Viewing the subject generally, it may be added that the moderate use of these drugs is the rule, and that the excessive use is comparatively exceptional. [P. 264]

Since this report, many observers have challenged the conclusion that even excessive use can be a major cause of "insanity".^{196,235,406,458} On the other hand, two Indian members of the original Commission felt that a stronger statement should have been made, and indicated that the majority of medical witnesses felt that the use of hemp drugs was deleterious. They recommended that both *charas* and *ganja* be prohibited but that the use of *bhang* should continue to be permitted. Their dissenting opinion is summarized by the following statement:

I believe that the injurious effects of the hemp drugs are greater and their use more harmful than one would naturally suppose to be the case after reading the concluding portion of Chapter XIII of our Report, although I think I should say that the facts elicited by our inquiry do not go to support the extreme opinion held by some well-intentioned people that these drugs in all their forms and in every case are highly pernicious in their effects. [P. 374]

In a series of articles, Chopra and associates have discussed mental and physical effects of chronic cannabis use in India.^{124,126,127} Much of their data is based on a study of over one thousand cannabis users. The major project represents one of the few attempts to investigate a large group of cannabis users who were not selected from an obviously pathological or deviant population (that is, not psychiatric patients or prison inmates). The researchers report that among regular users of the potent *ganja* and *charas* a small percentage suffered from serious psychiatric disorders, and that minor emotional problems, including impairment of judgement and memory, were observed in these subjects. According to the authors, a significant proportion of this group had pre-existing neurotic tendencies which may have contributed to their problem of drug use. In some instances, cannabis use was seen as an attempt at self-medication in response to these disorders rather than as the cause. Heavy users were often observed to show marked inactivity, apathy and self-neglect. The majority of those who took small doses of any of the cannabis preparations felt that the overall consequences of their drug habit were harmless or beneficial, while the majority of those who chronically took heavy doses, thought the practice harmful. These subjective judgements were generally consistent with the clinical observations reported.

In a separate study, the Chopras^{124,127} carried out a survey of:

Toxic insanity cases in all the important Indian mental hospitals between 1928 and 1939....A series of 600 cases...were thus collected for study with a definite history of indulgence in the use of cannabis drugs....Analytical studies of these 600 cases of cannabis insanity revealed that, although it was comparatively easy to elicit a history of a cannabis habit from such patients, it was often difficult to ascertain whether this narcotic was the primary cause of insanity or indulgence in it was only secondary to the existing mental disorder.¹²⁴ [Pp. 4-29]

Four hundred cases were found in which the authors felt that the cannabis habit was the only clear cause of insanity. In the remaining two hundred cases, a variety of other factors such as heredity or indulgence in other drugs, were considered important as well. They describe a variety of acute mental disorders which they feel are attributable to the use of cannabis drugs, including confusional, maniacal, depressive and delusional disorders. Chronic disorders were less common but reportedly took the form of a toxic mania, schizophrenia or dementia. Unfortunately, no control group of non-users of similar socio-economic background was studied by the Chopras in this series of investigations, but their data do allow some comparisons within the types of users studied.

Recently, G.S. Chopra reported on 200 cases of psychotic reactions to cannabis seen between 1963-68.¹²³ The subjects fell into three main categories: Group I (34%) no previous history of mental disorder; Group II (61%) most were on the "threshold of psychosis"; Group III (5%) chronic psychotics with cannabis intoxication superimposed.

Dube has conducted a general epidemiological study of health and mental illness in a North-Indian town and surrounding rural area.^{163,165} General drug use was very low in this district. Significantly more psychiatric disorders were found among the cannabis users than among the non-drug-using subjects. Although the author does not conclude that drugs were the direct cause of the

pathology observed in these cases, he has described elsewhere a cannabis toxic psychotic reaction with schizophrenia-like features, and a dull lethargy in some chronic users.¹⁶⁴

A few cases of cannabis-associated anxiety or psychotic reactions of varying duration have also been recently reported among North Americans visiting or living in India.²⁴⁵ The Commission has been informed of several such occurrences, as well.⁴³⁸ These cases have typically involved the use of very potent cannabis materials under generally unusual, unfamiliar and, in some respects, stressful circumstances.

A Moroccan study by Roland and Teste (also presented by Benabud in 1957⁴⁵) has received considerable attention in discussions of "cannabis psychosis".⁵²⁹ The report, based on a study of hospital records, provides a variety of subcategories of psychotic reaction to cannabis. The majority of cases were reported to be acute reactions to "sharp toxic overdose" associated with heavy use and were not as long-lasting as functional psychoses. The average duration of hospitalization was about six weeks. The investigators also felt that heavy cannabis use may mobilize or aggravate schizophrenia in predisposed individuals and may also interact negatively with malnutrition, alcoholism and other disorders. The problem chronic users in this study smoked enormous quantities of cannabis. "The average number of pipes smoked is between twenty and thirty, but figures of forty to fifty are not infrequent." A similar and more recent report has been presented by Defer and Diehl.¹⁵¹ Other authors writing on the Moroccan situation include Sigg and Christozov.^{560,131} In these studies, the majority of the severe chronic problems occurred in illiterate and impoverished slum dwellers. Moderate users, especially in the country districts, showed little sign of untoward effects.

After visiting some of the hospitals involved in the above reports, Mikuriya has challenged the validity of the clinical and diagnostic data in Morocco.⁴³⁴ Few of the patients were seen by professional psychiatric personnel, diagnoses and case histories were often not based on adequate information, and many standard neurological and physiological tests and post mortem facilities were unavailable. Murphy states that:

...the clinical data which he [Benabud] presents are unclear, and it is not easy to infer from his paper just what characteristics or patterns are taken as distinguishing a cannabis psychosis from the acute toxic states associated with malnutrition and endemic infection.⁴⁵⁸ [P. 10]

In Egypt, Soueif studied two groups of hashish users, and two control groups of non-users.⁵⁸³ While hashish takers were found to be more anxious than the controls, no significant differences were found in other personality variables. No cases of psychosis or serious deterioration were noted. Moderate negative correlations were obtained between the amount of hashish consumed and the number of hours worked per day. Soueif is presently conducting a much larger study of imprisoned hashish smokers but has not yet published a full report.^{414,584} Preliminary information suggests more impairment in cognitive and psychomotor function in these individuals than in non-hashish-using prisoners.

Bouquet of Tunisia argued that chronic intoxication with hashish leads to

mental and physical deterioration.^{70,71} Chronic users of raw hemp or marijuana, however, apparently rarely attain a condition of dementia, but reportedly show a reduced capacity for work and a tendency towards anti-social acts.

There were a number of papers published on cannabis in Nigeria in the 1950s. Fifteen to twenty per cent of some mental hospital admissions were attributed to the drug.^{23,66,347} While a variety of psychiatric disorders are reportedly linked to cannabis consumption, a clear picture of a specific “cannabis psychosis” does not appear. Lambo commented:

...the falsity of viewing drug addiction as itself a cause of various types of mental disorder is immediately apparent. Drug addiction and other sociopathological phenomena, including crime, may vary concomitantly, but this variation itself may indeed be reflecting a change in a third phenomenon as, for example, the disintegration of the traditionally supported kinship groups giving rise to social isolation and economic deprivation of certain individuals....In the cities where women are gradually taking to tobacco and alcohol, and prostitution is rampant, abuse of drugs, especially marihuana, is not rare....It is virtually impossible in practice to separate out in terms of causes and effects the relationships of abuse of cannabis or drug addiction to crime of various types, to poverty, the decline of traditional social mores leading to sexual promiscuity and prostitution, divorce and one thousand and one other changes going on in many parts of Africa today.³⁴⁷ [P. 7]

Also in Nigeria, Boroffka states:

From the observation that many patients with the history of consumption of Indian hemp are admitted to mental hospitals, the conclusion has been drawn that it causes mental disease and some publications have in the past followed this view. This conclusion is not well founded and the relationship between hospital admission because of mental disease and a history of *Cannabis* is open to quite different interpretations.⁶⁶ [Pp. 381–383]

Boroffka does report that cannabis can precipitate schizophrenia-like toxic psychoses in certain individuals and may contribute to psychopathology in other forms.

The South African Government *Report on the Abuse of Dagga* [*cannabis*] notes that:

In most of the cases which were diagnosed as “dagga psychoses” on admission, alcohol had also played its part in producing the mental derangement....The consensus of psychiatric opinion is that there is no definite permanent dagga psychosis. There is produced a temporary intoxication which is maintained by repeated dosage, but the condition clears in the space of a few days when the intoxicant is withheld....when used in moderation, as it is apparently used by large numbers of Natives and when smoked in traditional manner through water, its effects are not serious; in fact, probably no more deleterious than smoking tobacco. Over-indulgence, however, leads to physical, mental and moral deterioration.⁶²⁷ [Pp. 23, 24, 42]

In 1939, Stringaris published a small monograph on various aspects of the “hashish habit”.⁵⁹⁰ Considerable attention was given to adverse psychiatric reactions illustrated by case histories observed in Greece. Miras has more

recently described a chronic hashish smoker syndrome which he feels has an organic base.⁴⁴² A preliminary report of a major study of 31 Greek hashish smokers, with an average history of chronic use of almost three decades, suggests no gross behavioural deviations or neurological disorders.¹⁸⁹ All of these subjects were gainfully employed at the time of the study. Further controlled comparisons and analyses are underway.

The history of cannabis in South America has been reviewed by Wolff⁶⁷⁴ and Cordeiro de Farias.¹⁴² These writers feel strongly that cannabis contributes heavily to mental and physical deterioration in South America, but others disagree. Adequate epidemiological and psychiatric data are lacking, however.^{312,453}

Prince and associates report that of 106 male admissions to the mental hospital in Jamaica, 24 per cent used *ganja* once a day or more, 40 per cent had never used it and the rest were occasional users.⁵¹³ This pattern of cannabis consumption was not different, however, from the estimates of cannabis use (based on a "key informant technique") in the communities from which the patients came. Acute toxic confusional states due to *ganja* were rarely seen in hospitals. The authors conclude that: "A so called 'ganja psychosis' is simply schizophrenia occurring in the ganja using population."

Beaubrun, who is currently conducting research (for the United States National Institute of Mental Health) on the chronic effects of cannabis use in Jamaica, reported that about 20 patients per year were admitted to the mental hospital with acute psychotic reactions allegedly due to *ganja*, and few of those became chronic. He concluded that:

We are therefore currently of the opinion that ganja is not of itself a significant cause of chronic psychotic illness, although it may precipitate a psychosis in latent schizophrenics, and can certainly produce acute psychotic reactions of a recognizable type.³⁷ [P. 5]

Recently, Spencer, also from the Carribean, reported nine cases of psychotic reaction in "patients who are known to have taken cannabis."⁵⁸⁵ The symptomatology displayed was reportedly different from "classical schizophrenia and manic-depressive illness".

In summary, reports from the East and other non-industrial countries have tended to concentrate on chronic heavy users of hashish or other potent cannabis preparations, such as *ganja*. The subjects of these reports have usually been illiterate and impoverished, and were often contacted through medical or criminal-legal channels. Few of the studies have adequate controls. Most investigators report that users of *bhang*, or marijuana, show few physiological and psychological ailments compared to chronic consumers of the more potent hashish. It is not clear, however, if the various forms of cannabis have differential effects on health. Moderate use is the general rule and heavy chronic use the exception. There is agreement that heavy cannabis use can, in certain circumstances, elicit an acute toxic psychotic reaction, and the contention is often made that such a response might precipitate a schizophrenia-like reaction in certain predisposed individuals. Other subtypes of psychotic reaction lasting from one week to two months have been frequently noted. There is no consensus regarding the existence of a

“cannabis psychosis” as a specific syndrome, clearly differentiated from endogenous or natural psychotic states, and although many investigators feel that persistent toxic doses can potentiate a variety of psychological disorders in certain individuals, others do not consider this a likely occurrence.

There is frequent mention in this literature that chronic excessive use is often associated with a lack of ambition, drive, ability to make and carry out long-term plans, etc. (often called an “amotivational syndrome” in the West), although the relative cause and effect roles of the drug, pre-existing personality, and socio-economic and nutritional conditions have not been fully clarified. Reference has often been made to chronic dementia and deterioration in a small fraction of individuals with a long history of excessive use, but again causal factors have not been well established.

It is not clear whether or not severe psychological disorders are any more common in the cannabis-using population than in non-using individuals of similar socio-economic background. Thorough, controlled studies in these countries, which isolate the long-term effects of cannabis from the powerful and pervasive socio-cultural, economic, nutritional and hygienic conditions described have yet to be reported.

ADVERSE REACTIONS IN NORTH AMERICA

Clinical Reports From North America

In the past few years there have been numerous clinical reports of a variety of adverse psychological reactions to cannabis use in North America after nearly three decades of relative absence of such papers in the literature. The majority of these clinical reports display many of the methodological problems seen in the bulk of the Eastern literature. Pre-drug personality, cause and effect relationships, and details of both the general patient group and the overall catchment population from which the subjects were drawn are rarely adequately explored and presented. Some reasonably well-documented reports have appeared, however, and certain recurring patterns and situations of adverse reactions are becoming apparent.

Among the first reports of adverse psychological reactions to cannabis in North America were two papers presented by Bromberg in 1934⁸⁵ and 1939.⁸⁶ Thirty-one psychiatric patients who had experienced “psychotic reactions” following the use of cannabis were described. Conditions characterized included acute intoxication (which might manifest manic-like features), emotional reaction to the somatic and psychological intoxication effects (lasting from hours to days), and toxic psychoses often due to an admixture of drug effects and basic functional psychoses such as schizophrenia (lasting for weeks to months). The validity of the role of cannabis in some of these cases has been challenged by several researchers.^{243,458} In a separate study, Bromberg found no psychoses among 67 marijuana users.⁸⁶ The author observed that the chronic dementia and deterioration attributed to long-term cannabis use in some Eastern papers had not been observed in North America.

Keeler has presented several papers on the characteristics of acute adverse reactions to marijuana.^{323,325} In one report, 11 cases from a student population

were described with symptoms including gross confusion, depersonalization, impairment of recent memory, depression, paranoia, anxiety and panic, and recurrence of unpleasant effects. None of the cases required hospitalization. The author suggested that "...dissolution of ordinary adaptive and defensive psychological structure may have led to the emotional disturbances observed."³²³ In addition, there were two other individuals whose life style changed after the use of marijuana, and four others who developed schizophrenic symptoms subsequent to the combined use of marijuana, LSD and amphetamines. Keeler also reported that multi-drug-using patients frequently admitted having experienced some kind of paranoid thinking at some time during a marijuana experience, usually taking the form of "law enforcement paranoia" or suspicions as to the motivation of friends.³²⁵ Keeler also considered the rewarding aspects of marijuana use in the patients:

Users of marihuana state that it is a source of positive pleasure, that it enhances creativity, that it provides insight, and that it enriches their lives. These are hardly minor claims. All but two of the 11 individuals reporting adverse reactions considered the benefits to far outweigh the unfortunate aspects and planned to continue use of the drug.³²³ [P. 131]

In a separate paper, Keeler and associates reported that four individuals, in a drug-free state, experienced a "spontaneous recurrence of marijuana effects"³²⁹ (that is, unusual visual or somatic sensations previously experienced during acute marijuana reaction). In two cases, the occurrences precipitated severe anxiety, while in the others, no distress was elicited by the experience. The authors point out that the recurrence of a drug effect (or "flashback") is not necessarily an adverse reaction and should be classified as such only if it precipitates anxiety of interferes with function. "Spontaneous recurrences are tolerated by some and enjoyed by others." They also note that the recurrence of clinical psychopathology that was present during the drug reaction is not a spontaneous recurrence of the drug effect, but should be considered an adverse reaction. The diagnosis is complicated when an individual has had similar reactions to more than one hallucinogenic drug since, in this situation, recurrences cannot be clearly assigned to either.

It would appear that discrete recurrences may be on a continuum with more subtle effects of cannabis use. For example, Keeler notes that some subjects claim that their perceptual awareness was increased by marijuana and that some degree of this enhancement remained with them after use.³²⁹ Perhaps also related is the 'contact high', or the experience reported by some users of feeling somewhat 'high' without the drug when in the presence of others who were 'high'. Although these various aspects of post-intoxication responses may be in some respects related psychologically and perhaps physiologically, in most situations they cannot be considered the same phenomena. The lack of clear agreement as to essential definitions in these areas prevents simple interpretation of the very limited data available. Definitions of "flashbacks" or "spontaneous recurrences" rarely accompany clinical reports in the literature.

Weil has presented a classification of marijuana adverse reactions which he considers statistically uncommon, but clinically valid.^{657,659} These conditions include: panic reactions, simple depressive reactions, recurrence of effects

("flashbacks"), precipitation of delayed psychotic reactions to hallucinogenic drugs, and atypical reactions in ambulatory schizophrenics. Over 200 cases were studied and the majority (over 75%) were considered panic reactions in which the person interpreted the acute physical or psychological effects of the drug to mean that he was becoming insane or perhaps dying. Except in rare instances, these reactions were self-limiting and of short duration. Weil stresses that labels such as "psychotic reaction" and "toxic psychosis" are often erroneously applied to such cases.

As will be elaborated upon later, the majority of the acute adverse reactions which come to medical attention apparently occur in novice, inexperienced users and generally, but not always, involve relatively high doses. These short-term panic reactions, which rarely result in hospitalization and usually last only a few hours, or at most a day or two, are hardly mentioned in the literature of countries where cannabis use has been common for long periods of time. These reactions are either too infrequent or are not considered significant enough to require medical attention and discussion. The "acute" cases discussed in the Eastern literature are generally more severe and may persist for days or weeks.

Becker has proposed an explanation for the North American pattern of short-term anxiety reactions, which is gaining considerable support.^{39,40,42} While the effects of low doses of cannabis are in some respects similar to the familiar alcohol 'high' in our culture, larger doses of cannabis produce effects which are qualitatively different from those a non-user is likely to expect or have experienced before. In many instances, it is the interpretation or meaning which the user attaches to these radically different experiences which determine the subsequent emotional response. Effects which are considered tolerable or even interesting or pleasurable to experienced users, may be frightening to a novice, who may fear a permanent derangement of his mind. Cannabis sometimes produces transient waves of mild anxiety or paranoia, which the regular user usually correctly attributes to the drug and has learned to control. These same effects may convince the novice that he is insane and bring on a severe panic. The response of others to this fear is of great importance—if they are not alarmed, and reassure him that the effects are not unusual or permanent, the anxiety reaction may be minimized. On the other hand, non-users, including some police and medical personnel, may react with alarm, and reinforce the notion that the person is at least temporarily insane (psychotic), thereby adding to his alarm. Becker's hypothesis would predict that as familiarity with the acute effects of cannabis in our culture increases, the frequency of short-term panic reactions among users will decrease.

In the past two years, a number of clinical reports have appeared which suggest that the chronic use of cannabis in North America may be causally associated with a variety of psychological problems of a more prolonged nature than the generally accepted acute reactions discussed above.^{34,318,345,441,448,496,499,500,543,550} Similar clinical reports have come from other industrial countries.^{50,148,593,623} In most of the cases described, considerable prior psychopathology existed, although this is reportedly not always the case, and there are numerous reports of adverse psychological effects in individuals

without obvious previous pathology. There have been a few individual reports in which cannabis use may have been associated with suicide, but a possible role of the drug is unclear in these cases. Suicidal thoughts do sometimes occur in a small proportion of users while under the influence of the drug, but there is little indication that such notions are carried through.²⁴⁹

Lundell has related some of his clinical experiences over the past few years with adolescent patients involved in the non-medical use of a variety of drugs in Montreal.^{383,385} Although no systematic, controlled study has been done, over a period of three years he has seen "thirty to forty cases drift into and out of treatment". Of a group of twenty of these patients, all "started on" cannabis, 16 used LSD or speed, and five used heroin. All had been "school drop-outs at some stage", three had been hospitalized for treatment, and two had experienced acute psychotic-like breakdowns. Since this initial report, five more "acute toxic reactions" have been observed.³⁸³ Lundell reports that his patients exhibited problems in perceptual and motor organization (on the Bender-Gestalt Test), inconsistency of social values, lack of judgement, impaired memory, change in appetite and personal appearance, paranoia, irritability, violence, hepatitis, "philosophical meanderings", and decreased interest and motivation. He stresses the importance of pre-drug use personality adjustment in problem cases, and notes that serious psychological difficulties preceded drug use in many of these instances. In discussing LSD and cannabis (which he considers the "disdainful dysphoriant"), Lundell points out the need to:

...test my hypothesis that continued use and abuse *May* lead to chronic organic brain syndromes which may be irreversible...as may be the case with chronic alcoholic indulgence....³⁸³ [P. 12]

Lundell considers drugs to be "dynamite" for adolescents going through a variety of identification and adjustment problems, and urges a cautious approach to cannabis until a systematic study has elucidated the possible causal role of the drug in the adolescent adjustment disorders he has observed.

Recently, in a widely publicized and highly controversial paper, Kolansky and Moore have described 38 young people who were "moderate-to-heavy" users of cannabis (but not other illegal drugs), and displayed a variety of serious psychological disturbances which the authors attributed to marijuana.^{343,344} These patients had been observed usually once or twice, as part of a consultation service which included about 500 psychiatric patient referrals over a five-year period. Features present in the 38 individuals, who reportedly had shown no pre-marijuana signs of significant psychopathology, included psychosis, paranoia, anxiety, confusion, apathy, depression, disturbances in visual perception, suicide attempts and pregnancy. The majority were not hospitalized, but were referred for treatment on an out-patient basis. The authors state:

It is our impression that our study demonstrates the possibility that moderate-to-heavy use of marihuana in adolescents and young people without predisposition to psychotic illness may lead to ego decompensation ranging from mild ego disturbances to psychosis.^{343,344} [P. 11]

The report has been heavily criticized by scientists and clinicians on a

number of grounds.^{189,198,425,465,551} Doubts have been expressed as to the adequacy of the pre-drug personality inquiry and case history constructions; objections have been raised as to the logic of broad conclusions and generalizations based on a restricted referral patient sample in the absence of normative or control data; and the unequivocal and perhaps over-simplified cause and effect statements presented have been criticized. Jones³⁰⁶ and Benson⁴⁶ have suggested that the article on the misuse of health statistics,³⁸¹ which followed the Kolansky and Moore paper in the journal, "...should be read with the first in mind". Many have argued that the chronic use of drugs is more often a sign of underlying psychopathology than a cause of it. In addition, it has been frequently pointed out that the initiation to drug use usually occurs in age groups where functional psychosis and other disorders typically become manifest regardless of drug use. In response to such criticism, Kolansky and Moore argue that other clinicians have reported similar cases, and go on to say:

For the practicing physician, the clinical setting is his laboratory where he has become as adept at drawing reliable conclusions from the clinical findings as the laboratory and experimental scientist draws from his controlled investigative setting.³⁴³ [P. 4]

While many scientists question the statement that clinical data can yield as reliable results, the authors do raise a number of important questions regarding the heavy use of cannabis by adolescents in their report. Because of the seriousness of the charges made, these hypotheses should be explored in a systematic and thorough fashion.

Although no adequately controlled studies have yet been published on the behavioural effects of chronic cannabis use in North America, a number of clinicians have described an "amotivational syndrome" in some chronic marijuana users on this continent. McGlothlin and West report that clinical impressions suggest that heavy use of marijuana may contribute to some characteristic personality changes, including apathy, loss of effectiveness, reduced drive and ambition, diminished capacity or willingness to carry out complex long-term plans, to endure frustration, to follow routines or to successfully master new material.⁴¹⁶ David Smith has described a similar condition in a small proportion of chronic users, "The picture in terms of social consequences is then similar to that of a chronic alcoholic, but without the physical deterioration."⁵⁷⁶ As discussed earlier, a similar syndrome has been described in long-term excessive users of hemp in a number of Eastern countries.

Thurlow has described a transient lack of drive and motivation in a small group of university students in Ontario, who were regular users of cannabis and, more rarely, LSD. The condition generally responded rapidly to drug withdrawal and routine treatment.⁶⁰⁷ A similar condition was described by Scher and Mirin.^{448,543} Although no systematic studies have been done, some observers warn that chronic cannabis use may cause prolonged disruption of cognitive functioning and school performance in the university student population.^{89,103,177,511} As noted in a previous section, no major consistent differences have been found between cannabis users and non-users on college scholastic performance, although some negative correlation is often reported

between cannabis use and grades. It would appear that the general "amotivational" condition is not prominent among college student cannabis users. It may exist in a minority of users, however.

While an association between chronic heavy cannabis use and an "amotivational" behaviour pattern in some persons in North America is generally acknowledged, the complexity of untangling any causal relationship between the heavy use of cannabis and the general life style has resulted in considerable controversy regarding the essential etiology of the syndrome. Gay has proposed that the role of marijuana in such cases may often be more symbolic than pharmacological.²¹⁶ Others have suggested a definite organic basis.^{83,383,550} Unwin considers that "the so-called amotivational syndrome" may in most cases be a "masked depression".⁶³⁷ Lecker felt that such a syndrome might represent an "operant conditioning state" during which the chronic user aims at the quickest way to get pleasure, and may revert more and more to the drug for instant gratification.³⁵⁴ McGlothlin has suggested that cannabis use by persons appearing "amotivational" was perhaps continued and intensified when the drug effects were compatible with their natural personality characteristics and preferred life style. He indicated that separating the various social, psychological and pharmacological components would be an arduous task. The issue is further complicated by the fact that heavy cannabis users in North America are usually regular consumers of other drugs, such as LSD.⁴¹⁴

A study by Suchmann suggests a close association between the use of marijuana in some young people and adherence to what is termed the "hang-loose" ethic. Central to this notion is the questioning of such traditional aspects of authority, behaviour and belief as conventional educational, religious and political institutions, pre-marital chastity and the accumulation of wealth. The investigator contends that while the "hang-loose" ethic may represent antagonism to the conventional world, it does not appear to create apathy and withdrawal, and that the smoking of marijuana is often part of the behaviour pattern associated with this ethic rather than the cause of it.⁵⁹¹ In contrast, however, some individuals have suggested that cannabis and other drugs may have a "cultogenic" influence on susceptible users, and thereby contribute significantly to the growth of what they consider to be an undesirable subculture in North America.³⁹⁰

A recent WHO report states:

It is possible that some long-term behavioural effects attributed to cannabis use are due largely or in part to the sociocultural context in which the drug is taken....Some of these patterns may be viewed as deviant by a majority of the society, but one would not be justified in attributing them to the pharmacological action of the drug.⁶⁷⁸ [Pp. 30-31]

In summary, mild, transient phases of anxiety and paranoia occur in some inexperienced and regular users of cannabis in North America. More severe panic reactions, especially among inexperienced users, have been reliably reported. The notion that cannabis may, under certain circumstances, precipitate a more prolonged psychotic reaction in predisposed individuals is gaining some support in the clinical literature, although there is no consensus as to the exact nature of the "predisposition" or its prevalence in the general

population. Other more prolonged adverse psychological reactions to chronic use (including personality changes and an "amotivational syndrome"), in some instances in apparently previously normal individuals, have been cited, but there is considerable controversy as to the validity and general applicability of many of the clinical reports presented. It is not yet clear what role cannabis plays in such chronic syndromes. Additional aspects of these questions are presented in later sub-sections. Given that a variety of adverse psychological conditions may be associated with or caused by cannabis use, the next step, and perhaps the most important one socially, is to determine the frequency and severity of such reactions in the population of users in North America, and to consider what might be expected in the future.

The Incidence of Adverse Reactions in Patient Samples

Although no proper epidemiological studies of adverse reactions to cannabis have been done, some impression as to the frequency of such cases in North America can be obtained from a number of limited surveys of clinicians and treatment services. These studies have generally inquired vaguely about instances of cannabis use which have come to professional attention, and typically encompass a range of undifferentiated cases covering a variety of social, psychological and physiological conditions. They often even include non-medical involvement in cases arising, for example, from parental concern over adolescent usage, rather than from any direct drug effect per se. In general, little information can be gained about the 'normal' user of drugs through patient or treatment service sampling, since the subject population is defined *a priori* as pathological. Treatment facilities make contact with relatively few people who are not patients, and their resulting experiences and attitudes are generally biased accordingly.

With few exceptions, hospital records are not kept in a form which enables an efficient search of treatment cases. In addition, ethical considerations regarding the patients' right to privacy often impose restrictions on easy access to data. Furthermore, the reliability and validity of psychiatric diagnosis, especially in drug-related cases, is often not adequate for survey purposes. Polling individual clinicians and simply counting cases seen medically in a community can be misleading since many such patients are referrals, seen by different doctors, and consequently may appear several times in the final totals. In addition, many clinicians are not well informed in the area of non-medical drug use, and surveys of such individuals often reflect personal attitudes as much as the epidemiological aspects of the situation. Since most cases of adverse reaction to cannabis are probably not brought to medical attention, even accurate diagnostic and treatment statistics must be considered underestimates of the overall incidence of the less severe conditions. Most acute reactions are probably easily handled by friends and other non-professionals. Fear of legal repercussions undoubtedly prevents many from seeking formal assistance. In any event, the number of drug-related cases must ultimately be interpreted in terms of the overall patient population, and more importantly, in terms of the extent and patterns of drug use in the general population from which the patients were drawn.

Unfortunately, these methodological requirements are rarely met in clinical reports.

During the 1930s and 40s a few reports were published on marijuana use in the United States Army.^{119,201,202,213,401,561} Perhaps the best known of these papers was the *Panama Canal Zone Report* of 1933.⁵⁶¹ In these various reports a total of 589 marijuana users were studied, almost all of whom were selected from patient or special counselling populations. More than three-quarters were black, and the subjects in these studies were typically in their early twenties, had poor educational and socio-economic backgrounds, were below average in intellectual ability, and usually had a long history of deviant or delinquent behaviour. They had generally been using marijuana for several years and many averaged two to five cigarettes daily, with some using twenty. No tolerance or signs of physical dependence were reported, although indications of "psychological dependence" were noted in a number of subjects. Almost none of the men used opiate narcotics, but most used tobacco and alcohol. Although there were frequently noted behavioural and personality disorders among these individuals, and generally poor adjustment to army life, only a few cases of psychosis were observed, and in only one was cannabis use considered a possible cause. The importance of long-standing underlying personality disorders was generally stressed with respect to deviant or delinquent behaviour. There was little connection between cannabis use and violence or serious crime. In none of these studies were control groups employed, so generalizations and conclusions are limited. Extreme chronic pathology is not to be expected among military personnel since such individuals would normally be screened out by entrance examinations.

Probably the most thoroughly investigated population of drug users in North America are college students. Murphy and associates surveyed the health services and student counselling centres in 126 colleges in Canada and the United States in 1966, asking about drug-related problems seen over the previous 18 months. Replies were received from 66 counselling centres and 80 health services. In total, 67 cases of acute cannabis adverse reactions were reported, 60% of which were considered panic states and 10% psychotic episodes. The majority of schools reported no cases.⁴⁵⁷

In 1966-67 Blum and associates surveyed the student health services at five West Coast schools in the United States. Drug adverse reaction cases seen made up less than 0.1% of the overall student population. Cannabis problems were not specifically mentioned. Based on student surveys, the investigators cautiously estimate that perhaps 14 "bad outcomes" occur in the student population for each one noted in official health records.⁶⁰

Keeler at the University of North Carolina reported that 28 of 40 multi-drug-using patients seen for psychiatric reasons (not necessarily drug-related) admitted having experienced paranoid thinking at some time during a marijuana experience. In most cases the effect was not severe and all of these patients were continuing cannabis use.³²⁵

Bialos has reported eleven cannabis adverse reactions seen at the Yale University Health Department during the academic year 1968-69. The school has a population of 8,500.⁵² Pillard noted that:

An informal survey of the Boston University Student Health Service, which cares for a student population of 20,000, revealed that only five to seven marihuana-associated anxiety reactions are being seen yearly.⁵⁰⁴ [P. 297]

Durham found no instances of "marihuana induced psychosis" at the Student Health Centres at the University of California at Berkeley and at Stanford University. In 1968 these schools had a combined student population of over 40,000.¹⁶⁶ Hochman reports that:

...though we now know that at least one-fourth of all UCLA undergraduates have been using marijuana two or more times a week for more than two years, acute psychiatric consequences are so rare that no such case has been seen in our Psychiatric Emergency Service in the last year.²⁷³ [P. 2]

Furthermore, a large survey of University of California undergraduates in Los Angeles found no difference between marijuana users and non-users in the frequency of psychiatric treatment or a variety of other psychiatric variables.²⁷⁶ The University of California at Los Angeles has approximately 25,000 students, over one-half of whom have tried cannabis.

Schwarz has reported that six cases of acute cannabis intoxication were admitted to the University of British Columbia Infirmary over a two-year period ending in spring, 1970. One patient was hospitalized three days, the others were kept overnight. None were diagnosed as being psychotic. Schwarz has also seen 14 cases of cannabis-associated psychological problems which did not require hospitalization, and cautions that his figures are probably low since some students may have been treated off campus. In 1970, the University of British Columbia had approximately 25,000 students, of whom probably close to one-half had used marijuana or hashish.⁵⁴⁹

Surveys of clinicians' experiences in the general community have uncovered considerably more instances of cannabis-user contact with treatment facilities than are reflected in the student figures. Apparently few of these cases have required hospitalization, however.

In a 1968 study primarily concerned with LSD, Ungerleider surveyed 2,700 clinicians in Los Angeles County, asking for reports on drug adverse reactions, broadly defined as "a drug-induced state which had led individuals to seek professional help". Fifty-nine per cent replied, reporting 1,887 cannabis cases which had come to their attention over an 18-month period.⁶²⁵ Unfortunately, no further information was obtained regarding the nature or severity of the cases, treatment required, referrals, other drug use, or the total patient population.

Studying much the same catchment population in California, Lundberg and co-workers surveyed (by computer) 701,057 consecutive admissions to the Los Angeles County USC Medical Centre from 1961 to 1969 and found only nine cases of marijuana-induced hospitalization during the entire period. Five cases followed intravenous use of a crude cannabis extract, one followed ingestion and three involved smoking. The latter four subjects were hospitalized for one day, and the others were released within eight days. The researchers felt that, because of the general "open door" policy and the enormous size of this general medical and psychiatric complex, the patient population seen represented accurately the spectrum of diseases occurring in

the metropolitan community of almost seven million people which it served. They indicate:

Marihuana was used widely in this area during the entire period of time covered in this study. It is estimated that more than 50% of high-school students in Los Angeles have used marihuana at some time. Total marihuana users in the region served by this hospital during this time period are estimated to be in the hundreds of thousands, with tens of thousands of frequent or chronic users. The paucity of hospital admissions suggests that there are rarely acute effects from smoking or eating marihuana serious enough to require hospitalization.³⁸² [P. 121]

D. Smith reported that:

At San Francisco General Hospital 5,000 acute drug intoxications were treated in 1967. Despite the high incidence of marijuana use in San Francisco, no 'marijuana psychoses' were seen. In fifteen months of operation the Haight-Ashbury clinic has seen approximately 30,000 patient-visits for a variety of medical and psychiatric problems. Our research indicated that at least 95% of the patients had used marijuana one or more times and yet no case of primary marijuana psychosis was seen. There is no question that such an acute effect is theoretically possible, but its occurrence is very rare.⁵⁷³ [P. 41]

Durham found no cases of "marihuana induced psychosis" at the Stanford-Palo Alto Hospital.¹⁶⁶ More recently, D. Smith has reported a variety of less severe, and infrequent, adverse reactions to cannabis in the Haight-Ashbury area of San Francisco. Such cases included acute toxic reactions and confusional states with anxiety, paranoia, disorientation, nausea and, more rarely, short-term psychotic breakdowns. Smith feels that chronic heavy marijuana use is often associated with social maladjustment and an "amotivational syndrome".⁵⁷⁶

At a large psychiatric hospital in New York, Hekimian and Gershon carefully studied 112 persons chosen randomly from the patient population admitted with a history of "drug abuse" over a seven-month period in 1967. This latter group made up 5% of total admissions. Eight of these patients were admitted in a toxic psychotic condition related to cannabis use. Of these eight, six had used LSD, seven had had previous psychiatric hospitalization or treatment, six described "primary or secondary symptoms of schizophrenia prior to smoking marihuana", one had been diagnosed a "schizoid personality" and the last was considered "depressive" prior to cannabis use. Four did not show rapid improvement and were further detained. Cannabis cases, like the eight described, apparently made up less than 0.4% of the 20,000 annual admissions to the hospital. The authors note that, "Our patients did not display a characteristic marihuana psychosis." [P. 179] They concluded:

These findings suggest that the protracted psychotic episodes after drug ingestion may be due to the superimposed insult by the drug on a preexisting psychiatric disturbance rather than to prolonged drug effect per se.²⁵⁸ [P. 130]

Keup studied 126 of 165 patients admitted to a Brooklyn Hospital in 1968 "with a history of drug abuse". Over two thousand patients were admitted during the same period. "Fourteen patients were found to have suffered, at

some time from cannabis induced psychotic behaviour of a more serious nature.” In two patients, cannabis seemed to be the direct cause of admission (less than 0.1% of all admissions); in four cases, the drug contributed to the events leading to hospitalization; and, in the remainder, cannabis had caused serious difficulties in the past. Keup stressed the varied symptomatology of cannabis-related pathology and the difficulties in relying on hospital diagnoses—only one of the cases was labeled “toxic psychosis” in the admitting diagnosis. Almost all of the cases had had considerable prior pathology, and six were considered schizophrenic—in some cases “mobilized or aggravated” by cannabis. In addition, most were multi-drug users. “In our series...none of the cases was pure enough to qualify as a cannabis case...”³³¹ Even in some of Keup’s primary cases, the role of cannabis in the disorder is highly questionable.

In the 1967 trial *Commonwealth of Massachusetts v. Leis & Weiss*,⁴⁰⁵ presided over by Judge G. Tauro, much attention was directed to the possible role of marijuana in mental illness. There was a consensus among medical witnesses that acute panic or psychotic reactions to cannabis did occur in certain circumstances. Furthermore, many witnesses noted cannabis-related problems of a more prolonged and subtle nature, often complicated by multiple-drug use. The information presented indicates that, at that time, severe or chronic cases of adverse reaction to cannabis rarely came to medical attention. No systematic studies or formal data were provided, however. In his testimony, H. Brill, director of a large New York State mental hospital which houses about 10,000 patients, reported that he:

...did not see any cases that could be traced and attributed directly to the effects of marihuana in the Pilgrim State Hospital...long term psychotic breaks that have been attributed to marihuana do not exist in our country to my knowledge....This doesn’t mean to say they don’t exist but they haven’t been identified.⁸¹ [Pp. 150–151, 169]

Regarding the incidence of hospitalization due to marijuana use, Fort¹⁹⁴ told the court:

I know of no people being admitted to mental health clinics or mental hospitals in this country solely because of problems associated with marihuana use. With the presently pervasive pattern of such use, certainly some people who come for help either in clinics or in hospitals have used marihuana at one time or another. But they do not come for help as a consequence of that marihuana use.¹⁹⁴ [P. 407]

Louria testified that at Bellevue Hospital in New York, he had seen only a “minuscule” number of patients who had been admitted with a “marihuana psychosis”. He estimated that one per cent or less of marijuana users would experience an acute panic reaction.³⁷⁸ Malleeson knew of only four cases over a three-year period at the University of London Health Service where cannabis was a compounding factor in admission. He felt that cannabis use may make psychological problems more difficult to deal with, but “...I believe the excessive smoking of cannabis is a consequence of the trouble and not the cause in all cases that I have heard of.”³³⁹¹ D. Farnsworth testified that ten cases of psychotic episodes due to cannabis use had been seen by his staff at the Harvard University Health Services, but he had “...not seen anyone with a

permanent psychotic injury with marihuana", nor had he seen any persons committed to a hospital as a result of "marihuana psychosis".¹⁷⁶

In 1969, the Committee on Youth of New York⁵ surveyed by mail 1,253 pediatricians regarding their attitudes toward marijuana. Responses were obtained from 755. Most of the respondents felt that marijuana was psychologically and socially harmful. About one-third had seen patients in the past year who used marijuana, and of these, 80 reported 337 patients in whom marijuana usage was part of the presenting complaint. No description was given of the nature or the severity of these symptoms, however.

All psychiatric hospitals in England were asked to report cases of admissions related to drug dependence in 1966. Out of a total national psychiatric admission population of 163,980 for the year, 82 cannabis cases were reported. On the basis of a subsequent analysis of these case reports, the investigators felt that in at least 37 instances, cannabis played a clear role in admission to the hospital. An increase in cannabis-related cases was reported in 1967.^{26,27}

The Narcotic Addiction Foundation^{464,537} surveyed medical practitioners in the Province of British Columbia in 1969 asking if they had ever had to treat a patient for his non-medical use of drugs. Of the 1,100 physicians who replied (42% return), 109 reported seeing 335 cases involving the use of marijuana, the majority appearing since 1966. Without being specifically requested to do so, in 90 of these cases the doctors volunteered the information that there were no adverse reactions associated with the case, or that the main concern seemed to be the anxiety of parents rather than any direct medical problem in the patient. A similar report of "parental referrals" has been made by Smith and Mehl.⁵⁷⁶ These findings call into question any simple interpretation of survey tabulations of marijuana cases seen by physicians. A similar proportion of non-adverse reaction cases may be present in other medical surveys. The 245 adverse reaction cases reported in the British Columbia study should be considered in the context of the population of over 100,000 persons in the province who had used cannabis in 1970.^{349,350,351} No further details were obtained from the physicians as to the nature or severity of the adverse reactions reported.

In 1970, the Hamilton Academy of Medicine surveyed its members regarding their attitudes toward, and experiences with problems arising from the non-medical use of drugs. Although no precise estimate of the number of drug adverse reactions was obtained, physicians did rate alcohol, LSD, amphetamines, heroin, barbiturates, solvents, cigarettes (tobacco) and marijuana with respect to their effects upon the health of their patients. While cannabis was definitely not considered harmless, marijuana was rated as having the least harmful effect upon health of the drugs mentioned.²⁵⁰ This finding would suggest that the incidence of serious cannabis problems is relatively low in the Hamilton region.

In 1970, the Newfoundland Department of Health and the Newfoundland Medical Association surveyed the practising physicians of the province.⁴⁷⁰ Physicians were asked about instances in which they "...may have been consulted by individuals with 'drug problems' or by concerned parents." No time interval was specified. Of seventy-two replies (approximately 20%

return), there were sixty-two marijuana cases reported. The nature of the consultation involved was generally not specified.

Silver, head of a drug emergency project at the Montreal Jewish General Hospital, reported that of approximately 100 adverse drug reactions of various kinds seen monthly during 1971, there were "amazingly few cannabis complications" and those that did appear were practically always novices to the drug who had become frightened. None of these people required hospitalization or medication for his anxiety reaction.⁵⁶²

Because of various administrative and communication problems, the statistics of the federal Poison Control-Drug Adverse Reaction Program can provide little epidemiological information regarding the non-medical use of drugs. It is interesting to note, however, that in 1970, 75 cases of adverse reaction were reported as attributable to cannabis. In the majority of these cases, cannabis was part of a general multiple-drug problem. The list contained twice as many males as females, and most of these individuals were under 24 years of age. Incomplete data for part of 1971 indicate 14 "pure" cannabis cases, including one instance of intravenous use of hashish extract, and 13 multiple-drug combinations. The most frequent cannabis combinations involved LSD, alcohol or amphetamines.^{107,463}

In the spring of 1971, the Commission conducted a pilot study in the Ottawa-Hull area of physicians' contact with, and attitudes toward, persons involved in the non-medical use of drugs over the preceding 12 month period.⁴³⁹ All physicians who were listed in the telephone book as general practitioners, psychiatrists, neurologists, pediatricians, or who had no specialty listed, were contacted. Two mail surveys were done and a number of selected telephone and in-person follow-up interviews were conducted. A general inquiry regarding the full spectrum of drugs was followed by a survey focussing on adverse reactions to cannabis. On the basis of this experience, tentative plans for a representative cross-national mail survey of physicians were abandoned. It became clear from this preliminary project that detailed and accurate data regarding the frequency and nature of drug treatment cases could not be gained from this type of investigation without enormous expenditure of time and money, if at all. Treatment records were generally not easily accessible, either to researchers or the physicians' staff, and responses were generally, at best, rough approximations, and in many cases were grossly inconsistent and contradictory within respondents. Although physicians were generally co-operative, in many instances a significant lack of knowledge or familiarity with the identification, diagnosis and treatment of problems related to non-medical drug use was revealed—even in persons with significant numbers of patients presenting drug-related problems.

In the cannabis survey, 57% of the 214 questionnaires sent out were returned. Because of incomplete data and obvious errors in the replies, as well as the other difficulties described above, accurate estimates as to the frequency of various cannabis adverse reactions cannot be easily obtained from this study. Other more general findings are of interest and can provide at least some broad information regarding physician contact with cannabis-using patients. This pilot study, at best, gives impressions of physicians' personal opinions and attitudes, and some glimpse of the epidemiological aspects of

the treatment picture. It also makes clearer the limitations of similar previous surveys.

Of the drugs mentioned in the general survey, alcohol was responsible for the largest number of cases, followed by amphetamines, multi-drug combinations, cannabis, hallucinogens, barbiturates and minor tranquilizers and opiate narcotics. There appeared to be a greater tendency to attribute adverse effects to cannabis when no alternatives were specifically presented than when other or multi-drug options were available on the questionnaire form.

Sixty-five per cent of the physicians reported having seen patients whom they knew used cannabis, but only about one-half of these had seen or treated any patients in connection with their cannabis use. Cannabis-using patients ranged from 10 to 47 years of age with a modal age of 18. One-third of the physicians reported having seen patients because of parental, school, legal, or other external concern rather than concern expressed by the patient himself. Approximately three-quarters of the doctors who saw cannabis-using patients because of such social pressures had not had to treat *any* of these persons for adverse reaction to cannabis. This information is in agreement with the situation described by Russell⁵³⁷ and Smith and Mehl,⁵⁷⁶ and clearly indicates that doctors are frequently involved in social consultation of little medical significance, and casts further doubts on simple tabulations of "cannabis cases seen" by clinicians.

A general picture of multi-drug use emerged in the majority of patients requiring treatment or attention. Three-quarters of the physicians who had seen patients in connection with their use of cannabis noted that other drugs were often equally or secondarily involved. Many of the patients seen for cannabis-related problems had serious prior or concomitant personal or social difficulties not attributable to the drug and, in many instances, patients' misuse of cannabis was seen as a symptom rather than a cause of underlying psychological disorder.

Almost one-fifth of all respondents reported having seen one or more patients with cannabis-related problems who had required psychiatric treatment. Several psychiatrists had patients referred to them, whom they felt did not require psychiatric attention. About one-fifth of the physicians had patients who had been seen by another physician because of referrals.

Almost one-fifth of the physicians had seen one or more patients with anxiety or acute panic reactions. Other adverse reactions, listed in order of decreasing frequency, include: prolonged depressive reactions, acute psychotic reactions, cannabis-induced recurrences ("flashbacks") of previous (non-cannabis) drug experiences, recurrences of previous cannabis effects, acute depressive reactions and prolonged psychotic reactions. Other drugs in addition to cannabis were involved in many of these cases. Almost one-fifth of the doctors indicated that they occasionally used drugs in the treatment of cannabis-related problems. Five to ten per cent of the respondents reported having seen one or more patients who had been hospitalized because of cannabis adverse effects. The majority of these were for less than one week, although two respondents noted cases in which hospitalization lasted for months.

Fourteen per cent of the doctors reported having seen some patients who had serious chronic social and psychological problems attributable to cannabis use which did not actually require hospitalization. Fifteen per cent of the respondents noted having seen patients whom they believed were suffering from persistent problems of thinking and cognition attributable to chronic cannabis use, and, in a few cases, organic neurological symptoms were suggested. Seventeen per cent of the doctors reported having seen one or more patients who displayed signs of psychological dependence on cannabis. One-quarter of the respondents reported having seen one or more patients whose school or work performance was thought to be adversely affected by cannabis use. Among these patients was noted some evidence of an "amotivational syndrome" or apathy and lack of energy and drive which was attributed to cannabis use.

Qualitatively, the overall findings of this feasibility study are in general agreement with the bulk of clinical reports of adverse effects of cannabis in the North American literature, and suffer from much of the same limitations and drawbacks previously discussed. Few conclusions can be drawn regarding the accuracy of the physicians' memories or the validity of the diagnoses and case histories involved. The high incidence of multi-drug use in problem cases complicates any cannabis-specific interpretation, but the study does give some general information as to the current drug treatment picture in this area. The study clearly points out limitations in the interpretation of other clinician or therapist surveys in the literature, and suggests that further work of this type would probably be of little additional value. Careful, intensive study of systematically selected cases and control subjects would be of considerably greater epidemiological import.

The Commission conducted a study of youth-oriented innovative services, drop-in centres, hostels, and 'street clinics' across the country.⁵²⁸ Mailed questionnaires, and telephone and in-person follow-up interviews with staff were involved. Of 80 organizations on our original mailing list, about one-third were able to provide information relevant to this discussion. All of the organizations reported that cannabis use was either very prevalent or common in the populations they served, but none of the facilities reported having had to treat anyone as a result of cannabis use. These data present an interesting contrast to the reports from the physician survey discussed above. This apparent discrepancy is probably a product of differences in the populations served and the functions played by the respondents in the two studies, as well as substantial differences in personal experiences, attitudes and beliefs regarding cannabis use.

The Commission also conducted a general survey of the diagnostic records of psychiatric hospitals across the country in the spring of 1971.²⁶⁰ All psychiatric hospitals in Canada were included in the survey with the exception of those specializing in the treatment of alcoholism, emotionally disturbed children, mental defectives, and aged and senile patients. Rehabilitation hospitals were also excluded, as were general hospitals with psychiatric wards (with the exception of British Columbia). Hospital record librarians were asked to report the frequency with which various drugs appeared as primary or secondary factors in the official diagnoses of the

patients resident in the hospital on the date of the inquiry. This effort was intended to serve only as a general barometer and gross preliminary inquiry into the extent to which the non-medical use of drugs had imposed upon the country's hospital system, and was not expected to provide a precise index of the actual number of drug-related cases in treatment. Of 56 psychiatric hospitals included in the survey, 51 were able to describe their resident populations.

In general, alcohol was the drug most commonly implicated in psychiatric disorders, followed by LSD and other hallucinogens, amphetamines, cannabis, opiate narcotics, and barbiturates. Of a total of 22,827 psychiatric in-patients from all provinces except British Columbia, cannabis was mentioned as a primary factor in 20 cases and as a secondary factor in 18 (representing a combined total of 0.17% of the patient population).

In British Columbia there are few psychiatric hospitals, and the largest such institution was only able to provide admissions records. Consequently, non-psychiatric hospitals with psychiatric wards were also surveyed in that province. Because of the different sample and data base for British Columbia, comparisons with the other provinces are limited. Twelve of thirteen hospitals contacted provided resident sample information. Cannabis appeared as a primary factor in 5 cases and as a secondary factor in 15. This represents 1.4 and 4.3%, respectively, of the 351 psychiatric ward in-patients in these institutions. At the major psychiatric institution (3,000 beds) there were no cannabis-related cases among 226 consecutive admissions for the month of April, but information on resident patients was unavailable. It is difficult to interpret the relatively high proportion of cannabis-related patients in the psychiatric wards compared to the consecutive admission pattern in British Columbia, and the general residential picture for the rest of the country. While extent and patterns of drug use specific to British Columbia may be a factor, the relatively small numbers involved and the limited nature of the data base and sampling procedures used complicates further comparisons.

Interpretation of even the general national figures is obviously not straightforward, nor was it expected to be. All hospitals which had reported cannabis-related cases were asked for specific case history summaries. A total of 40 case history reports were received in which cannabis was considered a primary or contributing factor in the admission. The age of these patients ranged from 14 to 27 years, and 73% were males. In spite of the limitations of secondary analysis of often condensed and incomplete case history reports, some general impressions of these patients emerge, and information was revealed which sets clearer limitations on the interpretation of the general statistical data obtained. Even though the initial inquiry specifically requested only the number of patients with drugs mentioned in the official diagnoses, in many instances hospital staff went well beyond diagnostic information and interpreted the request as a more general query regarding drug involvement in the patient population. Unfortunately, hospitals were not consistent in their interpretation of the request and may have also applied differential criteria for the various drugs. The cannabis-related case histories revealed that most of these patients had intense involvement with other drugs, including alcohol, speed and LSD and, in some cases, had only passing or

occasional experience with cannabis. It appears that in many instances drugs were considered primary or secondary factors essentially because of general information that the individual was a user, either in the past or at the time of hospital admission. The inclusion of such cases would undoubtedly give an inflated estimate of the role of cannabis in psychiatric disorder. On the other hand, as Keup has shown, many patients with drug-related problems are not detected in the admitting diagnoses and can only be identified by intensive background exploration.^{330,331} Consequently, diagnostic record sampling is bound to miss certain valid cases. Almost one-half of the patients in the follow-up study had been diagnosed schizophrenic at some time, and a high proportion of personality disorders and adolescent adjustment problems were also noted. In those patients in which further data were available, the duration of hospitalization ranged from a few days to several months.

In general, the cannabis picture in this study, which admittedly is only partially revealed, again reflects the bulk of the North American clinical literature. Hospital resident sampling techniques tend to detect more chronic cases than do consecutive admissions surveys, for example, and, as would be expected, these individuals generally showed considerable prior and concomitant psychiatric disorder and, typically, frequent or chronic use of other drugs. In only three instances did hospitalization appear to be the direct result of an acute reaction to cannabis use. No clear cases of "cannabis psychosis" were identified, although it appeared that in some instances the chronic use of cannabis may have contributed significantly to the condition which resulted in hospitalization. The data from this study do not allow firm conclusions regarding the causal role of the drugs in the cases described, and is subject to the limitations of incomplete case history reports described earlier. The data do suggest, however, that cannabis does appear as a secondary or complicating factor in psychiatric admissions in Canada, although such cases do not represent a significant proportion of either cannabis users in general, or of the psychiatric hospital patient population in particular. Significant changes in the extent and patterns of cannabis use in North America will undoubtedly alter the treatment picture, and such changes should be carefully and systematically monitored.

The Incidence of Adverse Reactions in Non-Patient Samples

In studying psychiatric patient populations we have *a priori* defined the group under study as pathological. Consequently, only limited information can be gained from tabulating the pathology within such groups. There have been a number of studies of marijuana users among prison populations. While such subjects are not necessarily pathological, they have clearly been selected for deviant behaviour and cannot be considered representative of marijuana users in general. Few controlled studies exist of cannabis users who were selected on some non-pathological or non-deviant basis. It would be preferable to compare a cross-sectional sample of marijuana users with a control group of non-users with similar social, economic, and educational backgrounds. Even this type of investigation can only demonstrate factors which are associated with the use of cannabis. It cannot indicate causality.

Long-term prospective studies would be most useful, but are extremely difficult and expensive to undertake.

The Mayor's Committee of New York studied 48 marijuana-using prisoners who had been smoking regularly for 2 to 17 years with a mean of 8 years. The number of marijuana cigarettes smoked per day ranged from 2 to 18 with a mean of 7. The investigators concluded that there was no evidence that the marijuana users had suffered any mental deterioration as a result of their use of the drug.⁴⁰⁷ Bromberg examined 67 prisoners who were marijuana users; none were psychotic, although neuroses and personality disorders were frequently found. There were no signs of chronic dementia or deterioration.⁸⁶

The Addiction Research Foundation of Ontario conducted a study of 232 confirmed marijuana users in Toronto in 1968 and 1969.⁴⁸¹ Prison and court referrals provided about one-half of the subjects and the remainder were volunteers not contacted through criminal-legal channels. The majority came from middle-class or upper middle-class homes, and 16 per cent were students. The average age was 22 (range: 15–42), and males outnumbered females four to one. The average duration of marijuana use was 2.7 years (range: 1–20).

Preliminary analyses suggest the following characteristics in this sample: the subjects tended to be multiple-drug users (tobacco and alcohol were used by almost all of the subjects, more than one-half had tried LSD and speed, and one-third had tried opiate narcotics); cannabis was generally used about twice a week in the company of friends, accompanied by passive rather than active behaviour. Almost all subjects found the usual effects favourable, although about one-third had had at least one acute unpleasant experience (physiological or psychological) with the drug; only 5% had experienced more than a few 'bad trips', and a similar proportion had experienced one or more unpleasant cannabis reactions lasting more than one day; about one-half felt that cannabis had improved their lives, while a much smaller proportion thought it had made things worse; the subjects "tended to be underactive physically, engaging in passive pursuits"; about one-third believed in the "protestant work ethic", while almost as many rejected it; more than one-half were thought by a psychiatrist to be psychologically unstable or disturbed. Twelve per cent regularly experienced a "contact high" or a "flashback" to their drug experience, 17% never experienced either of them, and slightly more than one-half experienced one of these at least occasionally. It is unfortunate that these two concepts were considered together as a single item since they are not clearly defined, and, as discussed earlier, are not necessarily related.

The researchers stress that their findings demonstrate an association, and not necessarily a causal relationship, between the regular use of cannabis and other characteristics described in this sample. The lack of a comparable matched control group precludes certain generalizations, and the frequent use of other drugs by these subjects limit conclusions specific to cannabis use. A complete report of this study will be published in the near future.

The majority of studies of cannabis users not selected from deviant populations have concentrated on college or high school students. In several

of these, psychiatrically oriented questions were asked and in a few studies some psychometric data were obtained as well. There are often serious problems with applying, to cannabis or LSD users, conventional psychiatric tests (for example, the MMPI) which have been developed and standardized on populations without psychedelic-drug experience, since in many instances the subject's response to a test item will be altered by his drug experience even if no residual direct effects exist. We have been unable to find any cross-sectional studies of cannabis users in which intensive direct clinical observations were involved. Correlational studies can, of course, only provide information regarding characteristics of cannabis users, and cannot establish causal relationships.

Several studies using personality questionnaires or inventories have found that cannabis users (especially chronic users and those involved in the regular use of other drugs) tend to obtain more deviant scores than non-users.^{84,103,181,570} Some investigations have found no appreciable differences between cannabis users and non-users on pathological dimensions,^{244,408,570,682} although other personality correlates have been noted. On the basis of such studies, cannabis users have been described as more open to experience, unconventional, individualistic, spontaneous, adventuresome, socially poised, impulsive, suggestible, rebellious, alienated, pleasure-seeking, anti-authoritarian, creative, aesthetically oriented, opinionated, unreligious, socially maladjusted, dissatisfied or depressed than non-users. On most variables, however, no consistent differences have been found between those who use cannabis and those who do not.^{59,84,232,244,247,277,408,415,476,553,650,682} It should be noted that the majority of users in these studies were students without extensive, heavy or long-term cannabis use. Most were light or intermittent smokers. There is apparently a greater tendency to find pathology among regular chronic users than persons with more casual involvement with the drug. It is not clear from any of these studies whether the personality attributes described lead to the use of cannabis or vice versa.

Robins and associates reported the first study of the long-term outcome of marijuana use in a group not selected for deviant behaviour. The subjects were 235 black men who had gone to public elementary schools in St. Louis, Missouri in the early forties. While the characteristics of such a population may have questionable applicability to present marijuana use in Canada, this careful retrospective study should be considered. Persons in this sample who had used marijuana (and no other drugs except alcohol and tobacco) differed significantly from the non-marijuana users in that the users had more often: drunk heavily enough to create social or medical problems, failed to graduate from high school, reported their own infidelity or fathering of illegitimate children, received financial aid, had adult police records for non-drug offences, and reported violent behaviour. While these findings indicate an association between marijuana use and these other behavioural characteristics in this population, causal variables have not been identified. The heavy use of alcohol in these subjects complicates the interpretation considerably. Among the subjects who used only marijuana and alcohol, almost half had medical or social problems attributable to drinking and more than one-third were definitely considered alcoholics. When those subjects who were classified as alcoholics were eliminated from the data, the only statistically significant

difference between the marijuana users and non-users was with respect to financial aid received in the past five years. Subjects who used 'harder drugs' (for example, heroin, amphetamines and barbiturates) in addition to marijuana and alcohol were significantly more deviant than non-users, even after the alcoholics had been eliminated from the sample. Almost one-half of the subjects who had used marijuana also had some experience with the 'hard' drugs.⁵²³

In a survey of University of California at Los Angeles undergraduates (half of whom had tried marijuana) no differences were found between users and non-users on history of psychological or psychiatric treatment, or a variety of other psychiatrically oriented survey variables.²⁷⁵ Similarly, in a Commission study of 108 adult cannabis users and 34 matched control subjects, no differences were found between the two groups in psychological problems reported or visits to a psychotherapist.²³⁹ By contrast, two studies of adults in the San Francisco area found that cannabis use was more common among those who had seen a professional psychotherapist.^{299,393} In a study of Harvard seniors, Walters and associates found more visits to a psychiatrist among those students who were users of marijuana or hallucinogenic drugs. However, in half of these cases, the individuals were not users at the time they saw the psychotherapist. Few felt that marijuana use was related to their seeking psychiatric help.⁶⁵⁰

Smart and Fejer of the Addiction Research Foundation have recently conducted two surveys which have examined the relationship between cannabis use and experience in psychotherapy. Among high school students in a semi-rural area of Ontario,¹⁸¹ for all drugs (including alcohol and tobacco) significantly more users than non-users had received treatment for psychological problems. Non-users who had received treatment noted family or school problems most frequently as the reason for treatment. Users of illicit drugs most often gave depression as the reason for therapy. It is difficult to ascertain the role of marijuana use in these data since the incidence of psychotherapy generally increases with age, as does drug use. The investigators point out that age differences may be a confounding factor in the correlation between marijuana use and treatment. As well, we do not know whether the treatment preceded or followed marijuana use. In presenting the difference between treatment frequency in users and non-users, there is no control for the use of other drugs, and many of these individuals are multi-drug users.

In their survey of adults in Toronto,⁵⁷⁰ these same investigators found that, overall, more cannabis users than non-users had been treated for psychological problems. However, when age was controlled, only in those over 30 was there a significant relationship between experience with cannabis and treatment. Marijuana users more often reported feelings of depression than did non-users. Again, neither the order of these occurrences, nor possible causal links were determined.

In Tart's study of regular marijuana users, about one-third had witnessed at least one person experiencing an "emotional crisis" with marijuana and slightly fewer had actually experienced a 'bad trip' themselves. The subjects were also asked during what percentage of the times they had gotten 'high'

had they witnessed a 'bad trip'. More than two-thirds estimated that such occurrences happened in less than 0.1% of the sessions. Two per cent of the sample indicated that 'bad trips' occurred in 5–10% of sessions. In the vast majority of the 'bad trips', friends and other non-professionals provided help or the incident subsided by itself. In approximately ten per cent of the adverse reactions some contact was made with professional treatment facilities.⁵⁹⁸

Campbell interviewed 144 cannabis-using young people. About one-third reported having had some "bad" or unpleasant experience with the drug; 5.7 per cent had experienced moderately severe reactions and 2.8 per cent had had what were called severe reactions.¹⁰⁵ In a Commission study of adult cannabis users²³⁹ one-quarter of the subjects reported having had experienced some negative reaction to cannabis in the past. Unpleasant experiences were listed as among the reasons for quitting or reducing cannabis use in a small proportion of former users in several studies, including Commission surveys.^{53,349,350,351,415,449}

In Smith's sample of patients seen at the Haight-Ashbury Clinic in San Francisco, one-third of those who used marijuana had experienced some adverse reaction at one time or another. Few of these instances were ever presented for treatment, however.⁵⁷⁵ Similarly, in a study of high school students in Ontario about one-third of the cannabis users reported having experienced, at least once, "confusion, anxiety or other unpleasant effects" from the drug. In addition, one-quarter of the users reported that they had experienced a recurrence of some aspect of cannabis effects while not using the drug. The quality, intensity or the general nature of these recurrences were not determined, however.²¹

Halikas found that 16 out of 100 regular cannabis-using subjects reported that they "usually" experienced at least one acute or post-intoxication unpleasant effect, and about one-half "occasionally" experienced some adverse effects such as anxiety, confusion or memory impairment. Two per cent "usually" experienced "anxiety flashes" as an after-effect, 22% have "occasionally" experienced this and 76% had experienced it "once or never". It is not clear if these responses coincide with the "flashbacks" occasionally noted in the clinical literature.²⁴⁹

In his study of West Coast United States schools, Blum has broken down "bad outcomes" into several categories and generally found relatively fewer acute adverse reactions to cannabis than to alcohol. Very few of the cannabis reactions described were severe enough to require professional treatment, and typically included such things as headache, nausea, emotional upset, sensitivity to criticism, and difficulty in thinking. Blum calculates that only about one in 14 adverse reaction cases actually are seen for treatment.⁶⁰

Goode found a tendency for women to report negative aspects of the cannabis 'high' more often than men. Less than 10% of male users reported sometimes feeling paranoid, while this was true of 21% of the women. Women more often noted that they had experienced depression (6% for men and 15% for women) and depersonalization (8% vs. 16%) at least once with cannabis.²³²

Although many gaps exist in the epidemiological picture of cannabis

adverse effects, studies based on non-medical samples provide little evidence at this time that cannabis causes a significant degree of pathology in the general population of users studied in North America. Some unpleasant aspects of cannabis effects are acknowledged by most users and it would appear that a significant proportion have experienced at least one generally unpleasant 'high' from the drug. Very few of these negative reactions require medical assistance. Although cannabis users in some populations may differ from non-users on a variety of personality variables, the majority of the findings are within the general range of normality, no uniform or consistent picture has emerged and causal relationships have not been established.

AMERICAN EXPERIENCE IN VIETNAM

In the past several years a number of reports have appeared of adverse reactions to cannabis among U.S. soldiers stationed in Vietnam. Surveys suggest that 25–68% of the hundreds of thousands of U.S. soldiers involved in the war have smoked the potent, inexpensive, and readily available Vietnamese marijuana.^{51,138,255,597,630} Cannabis use was reportedly higher in a psychiatric population than in other patients in 1968.^{115,509} The use of opium, both alone and mixed with marijuana, has also frequently been reported among U.S. soldiers and some investigators claim that half of the cannabis contraband seized contains opiates.^{319,597} However, good statistical evidence on the extent of drug use or its purity in Vietnam is not currently available.

Talbott and Teague reported that in 1967–68, persons suffering from acute, self-limiting psychosis associated with cannabis use and environmental stress, were appearing for medical treatment at the rate of one or two per month, from an overall population of about one-half million individuals. The authors described 12 cases appearing with acute symptoms including anxiety and fear, impaired cognitive functioning and memory, excited and disorganized behaviour, paranoia and other delusions, hallucinations, aggression (in one case, homicide was involved). A "definite toxic, organic quality" was noted. Ten patients recovered within three days and the other two within a week and one-half. In all cases, the situation described was reportedly the patient's first experience with marijuana, and in only two individuals was there significant evidence of previous psychiatric disorder.⁵⁹⁷

More commonly, reports from Vietnam have dealt with regular or heavy cannabis users with generally poor premorbid psychological adjustment. Fidaelo reported that in 1968, approximately five per cent of psychiatric admissions at an army hospital were cannabis-related psychotic reactions, generally in heavy users. This incidence is essentially the same as that noted by Talbott and Teague. In discussing a minority of cases which did not clear up in a few days, the author states:

It is not known whether this group represents schizophrenics who mask their psychosis with marijuana usage, or individuals with weak ego boundaries—severe character disorders, who are tipped into a psychosis by their experience with marijuana—or whether their psychosis is a direct pharmacologic effect of high concentrations of marijuana.¹⁸⁸ [P. 59]

Colbach and Crowe reported that out of a catchment population of 45,000

soldiers in 1969, about five cases per month (approximately ten per cent of the patients seen) appeared with schizophrenia-like psychoses usually associated with a history of heavy marijuana use. These individuals were characterized by a prior "borderline personality organization". No cases were seen in which marijuana was the primary cause of aggression directed to the self or toward others.^{138,139}

Marijuana was apparently often used by soldiers after a battle as a tranquilizer.⁵⁰⁹ Bey and Zechinelli have further suggested that chronic marijuana use may be a form of attempted self-treatment in some disturbed individuals in Vietnam. They described 20 consecutive soldier patients, all habitual users, who were hospitalized for 24–72 hours for acute psychotic reactions. "It was observed that all of these men had serious characterological problems and could be classified as 'borderline personalities'." The authors contend that:

Marijuana served directly and indirectly to assist the patients in achieving a costly homeostasis, in their efforts to cope with the core problems of identity confusion, low self esteem, ego weakness and shallow object relationships.⁵¹ [P. 450]

After reviewing some of the U.S. marijuana experience in Vietnam, and related literature, Hauschild concluded that cannabis:

...can precipitate mental illness in the predisposed. Excess use provokes an acute brain syndrome. Chronic use produces lethargy and apathy....There is general agreement that marijuana is not significantly associated with violent behaviour, and it does not apparently contribute to crime, as alcohol does.²⁵⁵ [P. 108]

J. Kaplan recently described a general problem of heavy multi-drug use (including opiate narcotics) in the military patient population. The majority of the problem patients had severe underlying personality and character disorders. A number of chronic drug users who smoked heavily "day in and day out" reportedly suffered from an "amotivational syndrome", characterized by passive behaviour, loss of complex goals, withdrawal from activities, procrastination, poor concentration, and reduced ambition.³¹⁹

It has frequently been pointed out that the set and setting of cannabis use by U.S. military personnel in Vietnam may approach the ultimate situation for producing 'bad trips'. One medical officer, after returning from Vietnam, voiced the opinion that:

...the soldier smoking pot in a situation where he wants to feel good and relax, and is away from the stresses of battle, may have a sense of well being and euphoria. The same soldier who has been in combat, who is suspicious of the people living in the area, not knowing how to distinguish a South Vietnamese from a Viet Cong, seeing his buddies being killed, watching young children destroy themselves and blowing up G.I.'s with them, will have paranoid feelings, become frightened under the drug and become more angry and vengeful. This did not only necessarily refer to soldiers who were in combat. The same type of heightening of paranoid feelings was evidenced in many soldiers who were feeling 'uptight' about their particular situation in Vietnam.³¹⁹ [P. 7]

The actual frequency of adverse reactions to cannabis in Vietnam is uncertain. Because of the frequent lack of confidentiality of medical records in the U.S. military, and the potentially severe penalties for illicit drug use,

which, until recently, potentially included the complete loss of war veterans' benefits,³¹⁹ a significant number of acute cannabis reactions, especially of the less severe variety, are undoubtedly never brought to medical or official attention and, consequently, will not appear in official statistics. The cases reported to date, although clinically significant, represent a low percentage of the psychiatric population treated and a very small proportion of cannabis-using soldiers.

Several observers have pointed out that even though drug reactions are now seen more frequently than in past wars, battle fatigue and psychosis, other acute war reactions, and psychiatric admissions in general are considerably lower among soldiers in Vietnam than in World War II or in the Korean War.^{243,597,608} It has been suggested that many of the marijuana cases seen medically may represent combat reactions complicated by, or coincident with, cannabis use. It has further been suggested that the high incidence of drug use among soldiers in Vietnam may possibly be masking, or to some extent, even protecting that population from traditional wartime reactions, although a variety of other factors such as improved training, treatment, and personnel turnover might well account for the differences reported.²⁴³ It should be noted that acute reactions have been described in individuals without obvious prior pathology, and in military personnel not actually working under combat conditions. Some observers have suggested that the recently increased number of psychiatric cases in Vietnam might be a function of drug use problems.¹³⁸

Clearly, a thorough and systematic investigation of the U.S. military experience with cannabis in Vietnam is indicated. Firm conclusions regarding essential questions as to the nature and the extent of cannabis-related psychiatric problems associated with the Vietnamese War cannot be made on the basis of the evidence presently available. Furthermore, the applicability of any such findings to present conditions of cannabis use in North America is limited, although it is clear that general conditions of physical and psychological stress are by no means restricted to military operations.

LABORATORY REPORTS OF ADVERSE REACTIONS

A major difficulty in interpreting clinical reports of adverse reactions to illicit drugs is that one rarely has adequate information regarding the quantity, quality and often, even the general identity of the drug involved. In the East, cannabis, when smoked, is invariably taken with tobacco and is, in some situations, mixed with other potent psychotropic compounds as well. Such practices obviously complicate clinical interpretation. Because of continual rumours of 'spiked' or adulterated cannabis in North America, it has been suggested that some of the adverse reactions described in the clinical literature may not have involved pure cannabis, but might be attributable to some other unknown drug. As discussed earlier, however, samples of cannabis mixed or adulterated with other psychotropic compounds have rarely been documented by chemical analysis in North America. Cannabis is usually what it appears to be, or may be diluted or cut with inactive plant substances. Adverse reactions to pure cannabis, both in the laboratory and in the community, have been documented. For example, the Commission has investigated two cases of acute panic or psychotic reaction in Ontario and

found, by chemical analysis, that the marijuana involved was uncontaminated and of high purity and potency. Interestingly, marijuana from the same original batch was used by over one hundred other persons, totalling well over one thousand individual instances of use without serious adverse reaction. The two cases described occurred simultaneously in the same session. Smith and Mehl have reported similar cases of idiosyncratic adverse response.⁵⁷⁶

Several experimental reports have contained descriptions of acute panic or psychotic reactions which have occurred under controlled laboratory conditions with pure cannabis compounds. It must be stressed, in this context, that scientific laboratory conditions often do not provide a particularly pleasant setting for drug consumption, or one which generalizes readily to normal social conditions of drug usage. Subjects, even in non-drug studies, are often apprehensive about being experimented upon. Consequently, one might expect to see a higher incidence of drug adverse reactions in some 'neutral' scientific laboratory or psychiatric hospital experimental settings than under conditions of normal social usage.

The Mayor's Committee of New York (1944)⁴⁰⁷ conducted experiments with 77 persons—72 of whom were inmates of various New York prisons. Forty-eight of these subjects had used marijuana previously and some had been heavy users of opiate narcotics. Cannabis concentrate was given orally in generally large doses and ordinary marijuana cigarettes were administered in various quantities. Using admittedly high doses, the researchers reported nine cases of psychotic reaction in the prisoners studied. In six instances, acute or short-term adverse reactions characterized by "...mental confusion and excitement of delirious nature with periods of laughter and anxiety" occurred and rapidly cleared. Three cases of "true" psychosis appeared to be associated with the experiment.

The precise role of marijuana in the psychotic states of the three unstable persons is not clear...[In the first subject] the psychotic episode was probably related to epilepsy....In the case of the second and third subjects, the fact that they were sent back to prison to complete their sentences must be considered an important, if not the main factor in bringing on the psychosis.⁴⁰⁷

None of the nine individuals had previously been a regular user of cannabis. The researchers indicate that:

Marihuana may precipitate a psychosis in an unstable, disorganized personality, when it is taken in amounts greater than he can tolerate....However, it should be noted that a characteristic marihuana psychosis does not exist. Marihuana will not produce a psychosis *de novo* in a well integrated, stable person.¹⁴ [P. 249]

Isbell, and co-workers gave various doses of isolated THC to a group of former opiate narcotic addict prisoners. With the higher doses "marked distortion in visual and auditory perception, depersonalization, derealization and hallucinations, both auditory and optical, occurred in most patients. Delta-9 THC, therefore, is a psychotomimetic drug and its psychotomimetic effects are dependent on dose." Such occurrences may also appear in some individuals as "idiosyncratic" reactions at lower doses. It has been noted that many of the symptoms which Isbell labelled "psychotomimetic" might be called 'psychedelic' by scientists with different attitudes or theoretical

orientation. Euphoria was consistently noted in most subjects, but in two individuals, the drug experience was definitely unpleasant, and they were released from the study.^{296,298}

Ames, in South Africa, administered cannabis concentrate orally, in moderate to high doses, to ten apparently cannabis-naïve medical staff volunteers, including herself. In a thorough report, the author drew many parallels between the cannabis-induced state and natural psychosis. Some transient anxiety and confusional reactions were noted among the subjects.¹⁶

In South America, Cordeiro de Farias demonstrated noxious marijuana symptoms in a group of cannabis-naïve medical personnel, after a series of trials in which the marijuana dose was repeatedly increased until significant acute adverse effects occurred. In the final test, quantities up to 5.6 gm of marijuana were smoked, and confusion and anxiety resulted in some subjects. In spite of the intentions of the experimenters, and the very large doses administered to inexperienced persons, no persistent adverse effects were reported.¹⁴²

In all of the laboratory examples of adverse reactions discussed above, subjects were given doses which exceeded, in some cases, many times their preferred or regular doses, or were cannabis-naïve medical personnel given large initial quantities of the drug. Many of the other subjects tested were prisoners and former opiate narcotic addicts. None of the individuals described were typical cannabis users given socially relevant doses.

In Commission laboratory experiments (including pilot projects), 65 "normal" cannabis-using individuals were tested under a variety of conditions a total of 180 times with smoked cannabis doses ranging from approximately 0.5 to 15 mg THC. The 'joints' were smoked completely and more rapidly than normal, using techniques which maximize THC delivery and absorption, although the doses given are within the general range of usual consumption in Canada. In three instances, acute anxiety or panic reactions occurred, which cleared within hours and left no residual symptoms. Although transient, these reactions were highly unpleasant and disturbing for the subjects and experimenters involved. The three subjects were young men, all occasional cannabis users, without experience with LSD or other potent hallucinogens, who presented no clear signs of prior psychopathology. It should be stressed that considerable individual differences exist in drug sensitivity and desired levels of intoxication. In addition, questions of tolerance may enter the picture. (See later section on Tolerance and Dependence.) In all three cases, the subjects were asked to consume more than they wished, and would have undoubtedly avoided the anxiety reactions had they been left to smoke to a personally selected optimal level of intoxication. One subject was under considerable psychological and physical stress at the time of the experiment, and this may have contributed to his reaction. No non-laboratory factors were identified in the other two persons.

A number of researchers in North America have indicated to the Commission that similar acute reactions have occurred in subjects in their laboratories as well, and several such cases have recently been mentioned in the literature.^{111,156,307,398,431,436} It would appear that the administration of cannabis to inexperienced or infrequent users under laboratory or hospital

conditions, in doses exceeding 10 mg THC (efficiently and rapidly smoked) or 30 mg THC given orally, entails a small but significant risk of acute anxiety reaction in some individuals (although considerably higher doses have frequently been given without untoward effects). Complications may also arise when cannabis is given in combination with alcohol or tobacco. No indication of persisting effects arising from a laboratory cannabis experience has been reported.

Since there have been few chronic or sub-chronic laboratory studies of cannabis effects in humans, experimental data pertaining to possible chronic adverse psychological effects are limited. In 1946, Williams and associates reported an increase in lassitude and indifference, and a lack of productive activity in prisoners given large doses of marijuana cigarettes (or Pyrahexyl) *ad libitum* daily for over a month. Unfortunately, no control group was run, so interpretation of these data are difficult.⁶⁷⁰

The Addiction Research Foundation's continuing experimental study of the effects of daily marijuana smoking has focussed considerable attention on the subjects' personal and socio-economic behaviour.⁴³⁶ (This research program is summarized in Annex B at the end of this chapter.) Experimental and control subjects, who were "normal" cannabis-using volunteers, were studied for several months under various drug conditions while living in a model "micro-economy" system in an experimental hospital ward. Subjects were given the opportunity of earning a living (in cash equivalent tokens) by constructing stools and weaving belts.

When large daily mandatory doses of marijuana were introduced after long periods of abstinence in the laboratory, work productivity tended to be depressed. Discontinuation of marijuana use after a prolonged period of forced daily smoking of high doses resulted in an increase in productivity. When the work output of subjects on a mandatory high dose was compared to that of subjects who consumed only the amounts they desired (which were, in fact, relatively small quantities) the forced-dose group showed dramatically lower average productivity, which was most pronounced in the first few weeks of testing. Some behavioural adaptation or tolerance to this effect of the drug seemed to develop over the course of the experiment, and differences between the mandatory and free-purchase groups were minimal toward the end of the experimental period. The researchers suspect that this productivity decrement is due more to a reduction in time spent working, rather than to inefficient performance.

No gross behavioural changes appeared during the experiments and there was no evidence of social deterioration, or a decline in concern over personal hygiene or physical condition. No intellectual deterioration was detected and chronic mood modification was not reflected in either staff ratings or the subjects' self reports. Repeated daily administration of the higher mandatory doses was considered unpleasant by the subjects, and a few acute anxiety reactions occurred. Psychiatric tests and examinations found no chronic adverse effects as a result of cannabis use in these experiments.

The relationship between some of the effects observed here and the so-called "amotivational syndrome", sometimes noted in clinical reports of chronic heavy users, is not clear, but the data do lend support to the notion

that cannabis, in certain circumstances, may reduce motivation for performing certain normally conducted tasks. Some characteristics of data of this type are very likely determined to a significant degree by the nature of the general living environment and the tasks involved. In this program, labour was of a repetitive, handicraft nature. Effects on work of a more intellectual or artistic variety, or on tasks of the subjects' own choosing, might yield different results, and should be explored. In addition, the stress or boredom of institutional living undoubtedly had some influence on the data, and conclusions must be limited accordingly.

SUMMARY AND DISCUSSION OF ADVERSE PSYCHOLOGICAL REACTIONS TO CANNABIS

A number of apparent conflicts exist in the North American literature on adverse reactions to cannabis. During the past few years there have been numerous clinical case reports of individuals who were suffering from a variety of acute and chronic psychological disabilities allegedly associated with cannabis use. Some writers have gone so far as to suggest that such a picture may be expected to be the typical outcome of regular cannabis consumption. On the other hand, surveys of hospital admissions and resident patients in North America have uncovered an almost insignificant number of patients with primary cannabis problems. Even university counselling and health services have a dearth of systematic records of serious cannabis difficulties. Although studies of college treatment facilities deal with a very select sub-group of the population, these statistics are interesting in that one can generally define the catchment population of students served by the counselling and health services, and often considerable information is available on drug use patterns in the population. Several limited surveys of private practitioners and clinicians in the general community provide some bridge between the apparently conflicting views presented by the clinical case reports and hospital and treatment facility records. In spite of severe methodological difficulties, studies of individual practitioners indicate that a significant number of cannabis-related cases do come to medical attention for a variety of reasons, although the role of the drug in the conditions described is often uncertain, and such patients apparently represent a minimal proportion of users. Cannabis cases are rarely referred to a hospital, suggesting a relative absence of major debilitating chronic problems in North America today. Available evidence strongly suggests that serious adverse reactions are infrequent and that only a small proportion of the adverse reaction cases which do occur ever come to medical attention.

Intensive psychiatric studies of cannabis users selected from non-patient populations are rare; reports of comparisons with proper control groups are, at this time, virtually non-existent. The few studies which approach these criteria have not demonstrated the existence of serious complications with cannabis use.

In conclusion, existing limited information suggests that cannabis use in North America has, so far, rarely led to reactions requiring hospitalization. Nearly all of the cases which have been hospitalized were acute, and were released in a matter of days. Severe chronic cases of "cannabis psychosis"

have not been scientifically documented, although there is some evidence that cannabis may contribute to chronic conditions in certain individuals. Lesser problems do come to the attention of clinicians often enough to cause concern, although there is no indication that cannabis reactions requiring medical treatment occur in more than a small fraction of users, and the nature of the problems presented are yet to be elucidated. It should be stressed, however, that treatment on an occasional or out-patient basis does not necessarily indicate that the disorder is not serious or that it is insignificant. The majority of severely disturbed individuals in North America are not hospitalized, and out-patient psychiatric care is becoming increasingly common in all areas of psychotherapy. Changes in the extent and pattern of cannabis use in North America will undoubtedly alter the epidemiological picture of adverse reactions as well. To date, long-term heavy cannabis use has been relatively rare on this continent.

The Eastern literature, by contrast, is much more suggestive of a link between heavy cannabis use and more prolonged psychological disorders. It should be restated, however, that in the East, moderate use is the rule and has not been shown to lead to serious psychological and physiological problems. The strongest evidence of adverse effects generally involves the exceptional chronic user, living under conditions of poverty, who reportedly consumes what seems to be an incredible amount of potent cannabis. Scientific and medical difficulties in interpreting the Eastern literature and generalizing from the social, economic and philosophic conditions involved to the present situation in North America have been discussed in detail earlier. In spite of these major difficulties, this literature cannot be discarded or considered irrelevant. If one assumes, for purposes of analysis, that the often-suggested cannabis-psychopathology link in the Eastern literature has some validity, significant contradictions appear when one compares the Eastern and Western-industrial situations.

Many observers have argued that the major reason we have not seen adverse effects comparable to those reported in some other countries is that most of what is consumed as cannabis in North America is weak or inactive marijuana, often cut with a variety of inactive substances. They further contend that if potent cannabis material were freely available, the North American picture would more closely approximate that presented in the Eastern literature. The recent experiences of North Americans in Vietnam lends some support to this view. The factors of availability and potency may well account for some of the East-West differences discussed above, but other social and economic, as well as scientific and medical factors complicate such a simple interpretation of the overall picture.

In the United States, marijuana is the most common form of cannabis and is generally brought up from Mexico and distributed across the continent. Until recently, hashish was considered a rarity in the United States. In Canada, however, with the exception of the West Coast, where marijuana apparently comes north through California, the use of hashish has been quite common for several years. Furthermore, it appears that in the past few years marijuana has become relatively less available in Canada, and in some areas, cannabis is most commonly seen in the form of hashish. Hashish used in

Canada is generally of reasonable potency. Analysis of recent police seizures and 'street' samples indicates that the marijuana available is usually mild, but definitely psychotropic. Consequently, one must conclude that much of the recent Canadian cannabis experience has been with potent material, but of usually limited availability. This is also the case in England.²³⁵ It has frequently been noted that the heavy chronic user in both the West and the East often uses other potent substances as well as cannabis. The role of other drugs in the pathological conditions often described is as yet unclear.

The vast majority of problem cases reported in the East were daily, long-term users who consume many times the amount of cannabis used by chronic smokers in North America. There are relatively few persons with a long history of heavy, chronic use on this continent. This is probably a significant factor in the differential treatment pictures presented. On the other hand, even in the Eastern literature most of the acute psychiatric hospital admission cases related to cannabis are relatively young men and, consequently, have had a limited duration of cannabis usage as well. Consequently, the chronicity of use factor, alone, cannot account for all of the discrepancies in the literature.

In the East, usually the lower classes have been studied. Subjects were mostly impoverished, irregularly employed, illiterate, malnourished and often from urban slums. In the West, especially in the recent literature, focus has been on middle-class, affluent users—often college students with above average drive and intelligence. Some of the older United States literature, which deals primarily with lower-class, urban slum-dwelling minority groups, presents a picture perhaps more similar to the Eastern problem user, although there is not enough accurate data for detailed comparison.

Some modern controlled studies of cannabis use in non-industrial countries are now underway, and will undoubtedly further clarify the factors involved in the apparent East-West cannabis paradox.^{38,74,189} It should be noted that Jamaica, which has had a long history of widespread use of very potent *ganja*, has not produced many reports of cannabis adverse reactions. In fact, recent Jamaican studies have shown little indication of cannabis-related problems in chronic users.

There is a tendency in much of the Eastern literature to differentiate between the effects of marijuana or *bhang* and the more potent, concentrated forms of cannabis such as hashish or *charas*. It would appear that chronic heavy cannabis users prefer the more potent compounds and are also more likely to be mentioned in studies of adverse effects. It is not clear, however, if the more potent preparations are per se any more or less likely to produce adverse effects in the long run than are the milder materials. A similar distinction, based on potency, has traditionally been made in the alcohol literature, with more serious consequences often attributed to the use of distilled liquor than to the consumption of weaker drinks such as beer or wine.⁴⁵⁰ Recent studies^{229,508,596} have shown, however, that even though acute poisoning with alcohol may occur more frequently with distilled spirits, long-term effects of chronic alcoholism are related to total alcohol consumed and not to the form or potency of the individual drinks. An analogy might exist between the alcohol and marijuana experience. While it is generally much

easier to consume massive quantities of cannabinoids in the form of hashish rather than marijuana (and this might make *acute* adverse reactions more likely with hashish), until further pharmacological studies are done, it would be premature to assume that one cannabis preparation is more likely than another to produce *chronic* adverse effects in the long run. It should be noted, however, that marijuana and hashish generally differ in relative cannabinoid proportions as well as overall THC concentration (in that the ratio of CBD and CBN to THC is usually significantly higher in hashish—see Table 2).

If attention is focussed on the North American literature alone, one is still left with an apparently paradoxical situation. If concern is directed to isolated (and, more recently, grouped) clinical case reports only, the impression is gained that there is, or soon will be, an epidemic of serious cannabis-induced psychopathology on this continent. On the other hand, attempts to locate severe chronic cases, starting from a broad population of users, or even a narrower population of general psychiatric patients and hospital admissions, have met with little success. This would strongly suggest that “cannabis psychosis” or other severe cannabis-related disorders requiring in-patient treatment are statistically rare in North America. This does not mean that isolated case reports are not clinically valid, however.

Based on what we now know from clinical and experimental reports, it would appear that given a certain set and setting, and sufficient dose, it would be possible to produce a marijuana ‘bad trip’ in a significant proportion of users. Furthermore, it has been established that in some individuals and circumstances, a severe and horrifying acute panic reaction can occur. What follows the acute panic reaction is less clear. In most instances the main adverse effects disappear as the ordinary symptoms of the ‘high’ recede, and few residual symptoms persist. There are, however, a few clear clinical reports of more prolonged psychotic reactions lasting days or, more rarely, weeks and months in individuals with little or no identifiable prior psychopathology. Prolonged reactions in chronically maladjusted individuals are more often reported, but still cannot be considered frequent. Some aspects of the conflicting views developing in the literature may be reconciled by the following analysis.

Alleged cannabis-related psychoses are often considered to be schizophrenia-like, and the “cannabis psychosis” syndrome is often defined with respect to “classical” schizophrenia as a standard. The opinion is frequently voiced that cannabis use may aggravate, mobilize or precipitate schizophrenia in borderline personalities. On the other hand, many investigators have argued that “cannabis psychoses” are just naturally occurring schizophrenic disorders in the cannabis-using population.^{193,406,458,513} Consequently, it would seem worthwhile to explore the schizophrenic syndrome, as it might relate to cannabis use, in more detail.

There is general agreement in the non-drug psychiatric literature that psychotic reactions can occur in predisposed individuals in response to emotional and physical stress. The ideal case of the *good premorbid* or *reactive* schizophrenic is a good example. A typical picture is one of acute psychotic breakdown, elicited by some specific and identifiable traumatic stress stimulus. Prognosis is generally good and reasonable recovery can be

expected. This situation can be contrasted with that of the *poor premorbid* or *process* schizophrenic, at the opposite end of the scale—where there is no clearly identifiable precipitating event, or acute onset of illness—but instead a more insidious and gradual process of dementia of long duration, with poor prognosis. This latter case more clearly corresponds to *dementia praecox* and the classical psychiatric notions of schizophrenia which pervade the older European literature and, significantly, seem to predominate in Eastern and Middle-Eastern psychiatric circles. The more acute psychotic reactions, which would likely be called schizophrenia in North America, are generally not considered “true” schizophrenia by clinicians of this latter theoretical orientation. In most cases of schizophrenia, onset of psychotic symptoms occurs in youth. Some borderline individuals may have displayed very few signs of psychopathology prior to the first psychotic break. In many instances pre-schizophrenic persons appear to manifest character disorders.

It is conceivable that a severe panic reaction to cannabis might serve as a precipitating stimulus for a more prolonged schizophrenic reaction in a borderline pre-psychotic individual. Such a hypothetical reaction might be expected to be of relatively short duration compared to the classic process or poor premorbid case. A number of case reports which fit this model have appeared in the North American literature. In addition, much of the Eastern literature on short- to medium-length cannabis-related psychotic reactions, which are often designated as being of shorter duration than “classical” schizophrenia, seem to follow this pattern. Whether or not such individuals would have experienced a schizophrenic break at some time, in the absence of drug-related stress, is an important, but difficult, question. There is no good evidence from which we can answer, but many observers feel that a significant number of borderline, schizoid or “compensated” schizophrenics may go through life without ever developing a full-blown psychosis.

There are no good estimates of the incidence of various kinds of endogenous psychosis in society—gross differences in diagnostic categories and practices preclude accurate data. Estimates usually range from 0.5 to 3% of the total population. Since schizophrenia itself is not a well-defined entity, and is probably a heterogenous group of perhaps etiologically different disorders with areas of common symptomatology, the picture is even more complicated.

If the assumption is made that one per cent of the general population might at some time display “schizophrenic behaviour” some interesting hypothetical conditions can be explored. The high risk period for initial schizophrenic breakdown is between the ages of 15 to 35, with perhaps half the cases initiating before the age of 25. This means that the onset of schizophrenic symptoms is most likely to occur in the same age groups that are presently the most frequent users of cannabis and other illicit drugs in North America.

In the following (admittedly over-simplified) hypothetical exercise, assume a city with a population of one million, with 150,000 persons between the ages 15–25, an incidence of ten per cent regular cannabis use in that age group, and an incidence of schizophrenia-like conditions in 0.5 per cent of that sub-population (0.05 per cent would be expected to show initial

schizophrenic breakdown per year if reactions were evenly distributed throughout the ten-year period). By multiplying through the various probabilities, one can predict that seven to eight cases of schizophrenia per year would occur among cannabis-smoking young people, even if no interaction existed between the drug and the disorder, and any overlap being merely random coincidence. Such cases undoubtedly exist and must present a difficult and challenging diagnostic and therapeutic problem.

It should be pointed out that schizophrenia is only one of many serious psychological problems which commonly emerge in adolescence, and a variety of other forms of psychological disorder would also be expected to occur by chance in a cannabis-using population. Some observers estimate that 10–30% of adolescents experience temporary or long-lasting psychological disorders or adjustment problems. Consequently, one would expect to see on a chance basis alone, a significant number of young people who were psychologically disturbed and using cannabis at the same time. In a small number of these individuals, the onset of both acute psychological problems and cannabis use would be expected to coincide.

While the above hypothetical exercise was focussed primarily on schizophrenia as an example, a similar analysis could be made for a variety of other personality and behavioural patterns which have been associated with cannabis use at different times in the literature.

Although good epidemiological data are lacking, many observers feel that the frequency of psychopathology in the chronic cannabis-using population is higher than would be expected by chance. If this were true, at least three reasonable explanatory hypotheses might be adequate, each with some current data for its support:

- (1) Pathological persons may be more likely to use cannabis (or to use it heavily)—especially when use is statistically unusual or deviant. This might, for example, represent acting-out or rebellious behaviour, attempted self-treatment, poor judgement, or an inability to find pleasure by other means.
- (2) Cannabis use may lead to an increased incidence of psychopathology. This could be a direct neurological effect, or, for example, the drug might conceivably precipitate or complicate a schizophrenic reaction in a predisposed person as discussed above.
- (3) Other factors may influence both psychopathology and cannabis use (for example, social alienation, socio-economic conditions, and family relations).

A fourth possible interaction between cannabis and psychopathology has been suggested by several authors.^{193,243,458} It is possible that cannabis use may mask and compensate for chronic pathology and reduce overt symptoms in certain individuals. This would lead to a lower incidence of pathology in some cannabis-using groups than in comparable members of the general population. This interesting hypothesis has not been adequately tested, although cannabis has been used as a tranquilizer in many cultures.

The clinician, in treating cases of concomitant drug use and psychological

disorder, is left in a very perplexing position. Armed with diagnostic and therapeutic concepts and techniques which are of questionable reliability and validity in even traditional non-drug cases, he must attempt to untangle the undoubtedly intricate and multi-dimensional causal and predisposing factors. It is clear that highly systematic and carefully controlled clinical research will be necessary to partial out causal variables, since there is no evidence so far that cannabis produces an easily-identifiable chronic condition of psychopathology. If such chronic conditions exist, they are likely to be shaped as much by the prior personality of the individual as by the specific pharmacological effects of the drug. It is unlikely that important questions will be answered by more anecdotal clinical reports of psychopathology or personality change coincident with cannabis use in ill-defined sub-groups of patients, especially in the present emotionally-charged atmosphere in North America. However, accurate clinical reports, put into proper population context, can provide valuable clues for subsequent systematic study.

AGGRESSION, VIOLENCE AND CRIME

Opinions in the literature on the relationship between cannabis and aggression, violence and crime are varied and contradictory. Laboratory studies of the acute effects of cannabis on human beings indicate that aggression and violence, at least under controlled conditions, are rare. Most investigators report a quieting or tranquilizing effect, although significant changes in behaviour are ordinarily difficult to detect at normal doses. No tendency towards aggression or violence was seen in connection with cannabis in any of the Commission experiments or social research. In a recent study, cannabis was much less likely than alcohol to produce signs of aggressiveness in a group of regular users of both drugs.¹⁰⁸ In addition, no signs of cannabis caused aggression were seen in the Addiction Research Foundation's sub-chronic experimental study of daily marijuana use.⁴³⁶

In Blum's survey of cannabis users, very few instances of aggression or fighting were noted, even though the subjects were willing to acknowledge other negative aspects of cannabis use.⁵⁹ One exceptional report from South Africa in 1938, where cannabis was given to a group of psychotic patients, noted that some of these individuals became irritable, excited and assaultive.⁵¹²

In rodents, cannabis usually decreases aggressiveness and fighting, even at doses which do not produce marked sedation, although under some unusual conditions (extreme cold, or starvation, for example) and severe chronic drug administration regimes some increase in fighting has been noted.^{112, 541, 559, 605} Cannabis has also been shown to reduce aggressiveness in monkeys.²⁴⁶ Generalizations which can be made from these animal studies to humans are, of course, limited.

Many of the Eastern studies discussed in the section under adverse psychological reactions, describe occasional impulsive anti-social or violent acts in certain chronic cannabis users. Most often, such behaviour is associated with acute psychotic reactions, usually in severely disturbed individuals. The incidence of such behaviour in even chronic cannabis users

is reportedly very low. On the other hand, Eastern observers often report a high incidence of petty crime among certain chronic users in the lower strata of society.

The *Indian Hemp Drugs Commission Report (1893-94)* concluded:

In respect to his relations with society, however, even the excessive consumer of hemp drugs is ordinarily inoffensive. His excesses may indeed bring him to degraded poverty which may lead him to dishonest practices; and occasionally, but apparently very rarely indeed, excessive indulgence in hemp drugs may lead to violent crime. But for all practical purposes it may be laid down that there is little or no connection between the use of hemp drugs and crime.²⁹⁵ [P. 264]

A book by P.O. Wolff, *Marihuana in Latin America: the Threat It Constitutes*, published in 1949, is often noted in discussions of cannabis and crime.⁶⁷⁴ In a critical review of the monograph, O.J. Kalant has pointed out that Wolff's report:

...is primarily a diatribe against marihuana....The book is practically devoid of hard data. The material presented consists mainly of conclusions and opinions of various authors, and of anecdotal examples of one sort or another.³¹² [P. 25]

Other investigators have come to similar conclusions regarding Wolff's report,^{232,321} and it would appear that it provides little scientifically documented evidence regarding the alleged association between cannabis and crime.

Gardikas reviewed 379 cases selected from among persons who had been arrested for the public use of hashish in Greece from 1919-1950.²⁰⁸ Nearly one-half of the individuals described had previous criminal records, and of the remainder, almost two-thirds were later arrested for non-drug criminal offences. Many were noted as "habitual criminals" by the police only after they had first been arrested for hashish use. The investigator attributes much of the later criminal behaviour to the use of hashish, but many other potentially important causal factors were not explored. Although a correlation between hashish arrests and other criminal records existed in the group described, a causal relationship was not documented, and methodological limitations in the study prevent extrapolation to the population of Greek cannabis users in general.^{232,321}

Chopra suggests that cannabis use may actually reduce the occurrence of violent crime and aggression by decreasing general activity.^{122,127} In a recent report from Egypt, Soueif indicated that persons imprisoned for cannabis offences had a significantly lower frequency of non-drug criminal offences than did non-hashish-using prisoners. In addition, among all those with such criminal records, non-users exceeded users in the frequency of crimes committed.⁵⁸⁴

Although opinions are mixed, in general, reports from Eastern and non-industrial countries indicate that cannabis is not a significant cause of serious crime or violence, and is much less of a problem in this regard than is alcohol.^{1,23,71,114,127,321,347,453,458,613,627} The recent WHO report notes:

A revealing way to assess the contribution of cannabis to crime and violence is through a comparison with alcohol. The latter provides an established base-line, both from everyday experience and from reliable statistics. On the basis of such

comparisons, most authors are of the opinion that alcohol is much more closely associated with aggression and violence than is cannabis.⁶⁷⁸ [P. 32]

Violent crimes associated with acute psychotic reactions to cannabis are rarely reported in the North American scientific literature, although anecdotal stories have appeared in the popular press. As discussed earlier, recent reports of United States military personnel in Vietnam indicate that violent behaviour does occur during acute panic reactions in some soldiers under those conditions, although cannabis does not seem to contribute significantly to crime in the military (see earlier sections on Adverse Reactions).^{87,119,201,202,213,401,561,597}

Bromberg's studies were among the first systematic investigations of cannabis and crime in the North American literature. Although some correlation was observed between cannabis use and minor offences, no cases of murder or sexual crime due to cannabis were established. Bromberg concluded that there was no relationship between marijuana use and violent crime and challenged the validity of inaccurate case reports released to the general press by the United States Bureau of Narcotics.^{85,86,87} Some of these cases were later presented again by Munch,⁴⁵⁶ and these reports have recently been critically reviewed by Kaplan³²¹ and Goode.²³²

Blumer reported that marijuana-using juveniles were much less likely to be involved in anti-social and criminal behaviour than groups who preferred alcohol. He also indicated a tendency for delinquent activities to decrease as individuals shifted from alcohol-preferring groups to the marijuana subculture. On the other hand, Blumer also points out that some delinquents in his study used marijuana to ease anxiety and to fortify themselves for premeditated criminal acts.⁶¹ Other drugs including amphetamines, barbiturates and alcohol are also commonly used for this purpose.

The 1969 Woodstock Music Festival is often noted in discussions of cannabis and aggression. Cannabis was reportedly used by the vast majority of the nearly one-half million participants. Police indicate that no fighting or violent behaviour was detected.^{169,609} The significance of this happening, of course, is difficult to interpret because of the unique set and setting associated with the event. Other such festivals have not been as peaceful.

Some statistical studies in the past literature have shown a correlation between cannabis use and other minor criminal behaviour. Many reports of drugs and crime have included drug offences in with other violations and the data are, consequently, difficult to interpret. Reports of cannabis consumption among criminals, and the incidence of other crime among individuals arrested for drug offences, also suggest some statistical relationship. A causal effect has not been demonstrated, however, and a number of important psychological and socio-economic variables complicate the interpretation of these data.

Goode studied 204 New York cannabis users from different backgrounds and occupations. Many were middle-class and nine had been arrested on marijuana charges. The overall arrest frequency in this sample was similar to the national average, but no matched control group was studied. The most frequent violation noted (over one-third) was associated with non-violent

picketing or demonstrating. No other single violation occurred more than a few times in the arrest list. There was no correlation between levels of marijuana use and arrests. That is, frequent users were apprehended for crimes no more or less often than infrequent users. Goode also critically reviewed the scientific literature and law enforcement reports pertaining to the alleged criminogenic effects of cannabis and concluded that, "All 'studies' which claim to establish a causal link, upon close scrutiny, simply do not observe even the most elemental rules of rigorous empirical proof."²³²

The briefs presented to the Commission by the Royal Canadian Mounted Police and the Solicitor-General's department dealt at considerable length with the alleged association of illegal drug use and criminal behaviour in Canada.^{532,533} It was suggested that the use of drugs such as cannabis is, or will be, related to subsequent non-drug criminal activity. Of 239 cases during 1969 and 1970 relating drugs and other crime, provided to the Commission by the R.C.M. Police, 72 involved cannabis alone. (Alcohol-related crimes are generally not recorded.) Five of the 239 cases note crimes committed under the influence of cannabis—two crimes of violence, three crimes against property. An additional 33 cases report convictions for possession of cannabis, where the accused had prior records for other crimes. Another 16 cases involved persons arrested for non-drug crimes, but who were found to be in possession of cannabis at the time of their arrest. Six persons told police they committed property crimes in order to obtain cannabis, and another three, charged with non-drug crimes, admitted to the prior use of cannabis. Nine cases involved crimes of violence in connection with trafficking in cannabis. Reports of violence within the illicit drug market in Canada have been received by the Commission from other sources also, and similar examples were discussed by Cooper.¹⁴¹ Apart from these few isolated cases, the R.C.M. Police said that even though they "...lack evidence of crime committed in Canada by cannabis users" such data is available from other societies. We have been unable to find scientific documentation of a criminogenic effect in the international literature.

Major governmental inquiries around the world for three-quarters of a century have come to generally similar conclusions regarding the lack of a causal relationship between cannabis use and major crime.^{235,295,407,631,633,634,635,678}

There is no scientific evidence that cannabis use, itself, is significantly responsible for the commission of other forms of criminal behaviour. While individuals with a delinquent or anti-social background have, in the past, apparently been more likely to use cannabis than other individuals, the social situation has changed rapidly in North America. Few crimes committed under the influence of cannabis have been adequately documented, and a causal relationship between the use of the drug and other illegal behaviour has not been established. It may well be that an individual who is inclined to commit one illegal act (for example, a drug offence) may also be more likely than average to transgress in other areas as well. Some observers feel that the lessening of inhibitions often reported with cannabis use might, in certain predisposed individuals, increase the likelihood of anti-social behaviour. In addition, some criminal individuals might use cannabis or other drugs to lessen anxiety and give courage before a premeditated illegal venture.

Aggression may occur as a component of an acute adverse reaction in some instances, but such cases are apparently rare.

PHYSIOLOGICAL EFFECTS

Acute Effects

The short-term physiological effects of a typical cannabis dose on normal persons are generally quite benign, and are apparently of little clinical significance. Perhaps the most commonly reported physiological response to cannabis is a dose-related increase in heart pulse rate. In Commission experiments, a dose producing effects generally within the range of the subjects' past experience reliably increased pulse rate by more than one-third. A slight increase in systolic blood pressure was also seen at the higher dose. These cardio-vascular effects disappeared within a few hours. Other studies in the literature have been inconsistent with respect to blood pressure effects—some investigators report an increase with cannabis, while others found no change or a slight decrease.^{284,296,301,407,564,670} Synthetic THC-like compounds have been shown to produce major reductions in blood pressure in some species.²⁵² Changes in the electrocardiogram are reportedly minimal for normal subjects.^{284,301,436} Subjects with cardiac abnormalities have not been studied, however. Marijuana may reduce the typical heart rate response to breath inhalation or coughing.⁵¹⁹

Cannabis reliably induces a swelling of the minor conjunctival blood vessels in the membranes around the eye, producing a slight 'blood-shot' appearance (termed *conjunctival congestion*) similar to that seen with alcohol.³⁹⁹ This finding was confirmed in Commission studies. (This effect may be, at least in part, a secondary consequence of local irritation resulting from an inhibition of tear glands and subsequent drying of the eye, but is not caused by direct smoke irritation.) No corresponding retinal vascular change has been observed within the eye,^{14,263} and the clinical significance of the conjunctival effect is probably minimal. A significant decrease in finger temperature in a Commission experiment suggests a slight constriction of minor blood vessels in the skin,⁴⁴⁰ although this latter vascular response has not been directly verified. Slight edema or puffing around the eyes sometimes occurs.^{16,155} Contrary to popular belief, there is no evidence of pupil dilation with cannabis, and recent controlled studies have detected no change or a slight pupillary constriction.^{155,265,297,661} A reduction in intraocular (within the eye) fluid pressure has been reported with marijuana and may have therapeutic significance.²⁶⁴

Salivation was significantly decreased by cannabis in a Commission experiment, even with low doses.⁴⁴⁰ There are occasional reports by users of initially stimulated saliva secretion, followed by a drying of the mouth, throat and nasal passages, but this bi-phasic response has not been verified in the laboratory. Minor effects on skin conductance and sweat gland activity were inconsistent both in Commission experiments^{251,440,518} and other studies.^{204,431,522} Cannabis may stimulate urination,^{16,407} but such an effect has not been clarified. No consistent changes in blood sugar functions have been

reported.^{161,279,397,407,505,661} Appetite is usually stimulated, but perhaps not as universally as commonly believed,^{3,16,248,279,407} and changes in hunger with the drug seem unrelated to blood glucose. Cannabis has not been reported to produce any significant changes in general hormone or blood biochemistry in man, except indirectly by eliciting general signs of arousal or activation in some instances.^{283,397,407,670} Acute use of cannabis does not seem to affect kidney or liver function or alter basal metabolism.⁴⁰⁷ No substantial changes in respiration have been noted with acute use,^{407,564,661,670} nor have significant alterations in deep tendon reflex and other simple nerve functions been observed in humans.^{284,297,527} High doses in rats may increase DNA content in brain tissues.¹¹² THC may lower body temperature slightly in humans,⁶⁵⁵ and large doses produce significant temperature reduction in animals.^{225,252,489}

The acute effects of cannabis administration on the electroencephalogram (EEG) are slight at 'social' doses and are generally considered to be of little clinical significance.^{189,308,527,641} Changes in sleeping EEG's (including REM phases) have not been clearly established, and existing reports are contradictory.^{32,285,522,574} Cannabis slightly alters the electrocortical visual evoked response in a way which suggests some increased reactivity or arousal effect.⁶¹¹ In a Commission experiment, enhanced two-flash visual discrimination also suggests some neuro-physiological (perhaps cortical) activation with the drug.⁴⁴⁰ Much higher doses in monkeys, however, produce changes which seem to reflect an ultimate depressant action.⁷⁶

The effects of cannabis on neurohumoral transmitters is unclear. Existing studies are conflicting, but it appears that there is some alteration in brain concentration of catecholamines, serotonin and other neurochemicals in most of the animals studied.^{67,80,140,207,286,409,446,565,579,619} The significance of these changes is ambiguous, but information in this area is increasing at a considerable rate.

Ling and associates reported that daily administration of THC to rats (for four days) failed to produce significant effects on general adrenal and gonadal activity, except at very high doses. However, an involution of the thymus gland was observed, which was similar to that produced by stress.³⁷⁰

Muscle strength seems to decrease with higher doses of cannabis. In Commission research the upper dose produced no change in maximum momentary strength of hand grip, but a one-minute sustained finger grip task showed a decrement, even five hours after smoking.⁴⁴⁰ Similar effects have been observed by others at higher doses.^{284,407,507} Singh recently found no effect on acute muscle strength, but reported some evidence of reduced efficiency of work on a bicycle ergometer after marijuana,⁵⁶⁴ thus supporting the results of a 1901 study.¹⁸³ Paradoxically, the use of cannabis to reduce fatigue during hard physical labour has been noted in several non-industrial countries.^{16,38,73,124,125,295,534,651} The effects of the drug under normal labour conditions have not been systematically studied.

Recently declassified United States Army research (with synthetic forms of THC and related analogues) has shown that some cannabinoids possess significant hypnotic, anaesthetic, anti-convulsant, anti-hypertensive and temperature-reducing effects of possible therapeutic potential.^{157,252,638} Controlled clinical trials in humans have yet to be completed, however.

Severe acute gastrointestinal disturbances rarely occur with smoked cannabis, although nausea is not uncommon when inordinately high doses are taken, especially orally, or when anxiety is associated with use.^{16,249,259,284,407} Headache, numbing, vomiting, cramps, diarrhoea or constipation have also been noted in the clinical literature. In some instances, lack of co-ordination, ataxia and tremors have been observed, and chest pains, dizziness and fainting have occasionally been noted, usually with large doses.^{243,548} High doses can also induce sleep, and drowsiness a few hours after administration is not uncommon, even with smaller quantities. Physiological hangover effects analogous to those produced by alcohol have been described in some persons, but are apparently rare, even after considerable intoxication. Some persons report that they feel more refreshed than usual the next day. More commonly, either no effects or a slight feeling of heaviness and lack of energy may be present the 'morning after'.^{126,232,243,248,249,407,415,436,438,440,670}

Individual case reports of cannabis-precipitated diabetes and epileptic reaction have appeared.^{292,328,384} These suggestions seem somewhat paradoxical in light of the numerous reports of the anti-convulsant properties of cannabinoids, and the lack of consistent effects on the blood-sugar functions with the drug.

In the past few years, there have been conflicting reports that large quantities of cannabis extract injected into pregnant females of certain strains of rodents can affect litter size or may cause abnormalities in the offspring.^{63,217,218,498} These disparate results cannot be easily generalized to other species and give little information regarding human effects. At this time, there is no scientific evidence that cannabis adversely affects the human foetus, although it may cross the placental barrier in pregnant women, as it does in the animals studied. Existing studies have not found cannabis-induced chromosome abnormalities *in vitro*,^{356,404,468} in human cannabis users^{162,226} or in monkeys treated with cannabinoids.³⁷⁵

Cannabis has exceptionally low lethal toxicity. Few, if any, human deaths have been caused directly by cannabis overdose. Although several isolated deaths were attributed to cannabis in the older literature,⁶⁵¹ these cases were not clearly documented, and the actual role of cannabis in the fatalities is ambiguous and has been questioned.^{243,573,576,633} Recently, a death was attributed to cannabis overdose in an individual in Belgium.²⁶⁶ Cannabinoids were reportedly found in the body on autopsy, and no other cause of death could be determined. Even this one case has been challenged^{210,243} and given the international attention it has received, it may, if valid, be considered "the exception which proves the rule". A near-fatal case in which a young man attempted to commit suicide by ingesting massive quantities of hashish has also recently received wide publicity.²³⁴ In spite of his considerable effort, he was unsuccessful and has fully recovered. Lewis has reported a fatality allegedly caused by distention of the bowel during a prolonged bout of gross overeating under the acute influence of cannabis.³⁶⁷

Recently, there have been several reports of non-fatal acute physiological reaction to intravenous self-injection of 'home-made' marijuana extract. Severe body tremors, chills, fever, tachycardia, nausea, cramps, vomiting, diarrhoea, muscle aches and a variety of temporary systemic disruptions were

noted.^{212,261,334,335,382} These effects are probably not specific to cannabinoids, but likely reflect a general response to a variety of insoluble foreign compounds in the crude concoctions. Fortunately, instances of such use appear to be few, and only one case has been reported in Canada.⁴⁶³

From the point of view of lethal toxicity, cannabis must be considered one of the safest drugs in either medical or non-medical use today. It is possible, however, that cannabis may interact with other drugs taken concomitantly (for example, alcohol, barbiturates or opiate narcotics) and enhance their toxicity. (See later section on Cannabis and Other Drugs.)

In summary, at typical doses of cannabis use, few acute physiological effects have been detected. Those which have been identified generally seem to have little clinical significance. Even at relatively high doses, few substantial physiological changes occur. Overall, it would appear that increased heart rate, a slight reddening of the eye, and decreased salivation are the most consistent and reliable objective physiological measures of acute THC, marijuana and hashish use. A statistical combination of just these three variables was extremely efficient in differentiating various THC doses administered in Commission research.⁴⁴⁰

Chronic Physical Effects

There is little reliable information on the long-term physiological effects of cannabis use. There are numerous reports from Eastern countries of chronic ill health among very heavy long-term users of hashish.^{126,295,442,583} Most commonly reported are minor bronchial, respiratory and gastrointestinal ailments. A chronic dementia has been alluded to in some heavy hashish users in the East. As discussed in more detail in the section on psychological adverse reactions, the majority of the Eastern studies have no control group of comparable non-users for a reference standard, and clinical findings are usually confounded with a variety of social, economic, nutritional, hygienic and cultural factors, which are not easily separated. Reports are rarely documented with electrophysiological or autopsy data. The 1971 WHO technical report on cannabis notes:

It is questionable whether weight loss, emaciation, anaemia, constipation, etc., which have been reported to be associated with cannabis smoking in India, are due to the drug or to poverty, poor nutritional status, and intercurrent infections. Studies in the USA, have, by and large, failed to show any significant physical deterioration after an average of 7-8 years of marihuana use.⁶⁷⁸ [P. 26]

Furthermore, in most non-industrial societies, cannabis is almost invariably smoked with large amounts of crude tobacco, and occasionally other drugs, and the separate effects of the various substances cannot be easily isolated. Perhaps the only chronic physical effect of cannabis use which has been established from these reports is a condition of persistent conjunctival congestion in some users, analogous to the swelling of the minor conjunctival blood vessels around the eye seen in acute use. Both the etiology and clinical significance of this effect are as yet unclear.

Considerable concern has been expressed that the chronic smoking of cannabis might have cancer-producing effects similar to those now attributed

to tobacco. Although considerable variability exists among samples, it appears that the tar yield from crude marijuana may be comparable to that of commercial tobacco cigarettes.^{179,191,388} One study with mice indicated that tobacco and cannabis tar condensates had similar deleterious effects on mouse skin. The investigators stressed, however, that the findings do not indicate that marijuana is carcinogenic in the mouse or in man.³⁸⁸ In another mouse experiment, adverse effects of marijuana smoke were demonstrated on the cells of the respiratory tract.³⁶⁴ In a recent human study, microscopic analysis of the lining of the lung detected cellular changes in a sample of eight daily marijuana users somewhat similar to those seen in a group of subjects who only smoked tobacco.^{395,396} Epithelial abnormalities were found in the trachea of six heavy hashish smokers in another report.⁶⁰¹

Even if tobacco and cannabis were shown to be equally carcinogenic on a weight basis, significant differences in patterns of use would prevent clear comparisons of the cancer-producing potential of these drugs. The present common pattern of regular cannabis use in North America is more analogous to intermittent social alcohol use than to the picture of chronic daily smoking presented by regular tobacco users. Clear exceptions to this pattern exist, of course, and may become more common in North America in the future. Regular tobacco smokers generally consume much greater quantities of plant material than do chronic cannabis users. The deep inhalation and long retention smoking techniques usually used with cannabis in North America may add complications, since this practice usually results in almost complete retention of all smoke particles in the lungs, as well as the absorption of the desired active compounds. The adverse effects of the various (mostly non-psychotropic) substances in the smoke are not clear. In non-industrial countries the technique of cannabis inhalation is more similar to that regularly used with tobacco, and exaggerated inhalation and retention is not so common.

Tennant and associates reported on 31 military patients who smoked "enormous quantities" of hashish. Irritation of the respiratory tract appeared to be responsible for frequent ailments including bronchitis, sinusitis, asthma, rhinopharyngitis and uvular edema. There was also a high incidence of acne reported and some gastrointestinal disorders in a few patients.⁶⁰² Later, "below normal" vital lung capacity was also seen in similar patients. Although most of the individuals observed smoked tobacco as well as cannabis, the authors submit that the excessive use of hashish was primarily responsible for the conditions described.⁶⁰¹ Similar observations have been made with respect to chronic hashish smokers in Greece.⁴⁴²

Various isolated studies have suggested other possible physiological problems associated with chronic cannabis use. Although the role of cannabis in producing the effects has not been well-established in these reports, they indicate important areas for future research attention. One Moroccan paper reported arteritis in a number of cannabis smokers who consumed 10 to 15 pipe-fulls per day.⁵⁸⁷ Miras has made similar clinical observations in Greece.⁴⁴² Bowman found no evidence of altered tonic or phasic heart rate in chronic cannabis users in Jamaica.⁷⁴

Kew reported eight marijuana users who showed some liver dysfunction.

Although these subjects had used other drugs, they "had not taken intravenous drugs or used alcohol to excess".³³² Hochman and Brill studied 50 regular marijuana users in California with a mean duration of use of seven years. None of these subjects had a clinical history suggesting liver dysfunction. In the ten showing evidence of disturbed liver function in laboratory tests, the abnormalities were related to concurrent heavy alcohol use and were minimized by alcohol abstinence. There was no relationship between length of marijuana use and liver function.²⁷⁴ Tennant and associates found no abnormalities in liver-function studies of 31 patients who were extremely heavy users of hashish.⁶⁰²

Oki and Sisson have released some preliminary figures from the Addiction Research Foundation multi-disciplinary study of 200 regular cannabis users in Ontario. The average age of the subjects was 22 (range: 15-42) and average duration of marijuana use was 2.7 years (range: 1-20). Almost all of the subjects used alcohol and tobacco; more than one-half had tried LSD and 'speed'; and one-third had tried opiate narcotics. This frequent use of other drugs, as well as the absence of a comparable matched control group limits some of the conclusions that can be drawn from the study. Certain of the findings are relatively straightforward, others are not so easy to interpret. Compared to what might be expected in a similar non-cannabis using population, these subjects showed no indication of significantly increased incidence of disorders of the gastrointestinal tract, liver, kidney, spleen, or gall bladder; no dysfunction of the thyroid, parathyroid or other endocrine glands; and no blood cell abnormalities. Peripheral vascular disorders were rare and there was little evidence of cardiac conditions with the exception of some tachycardia and elevated blood pressure in a few subjects. Most had no bronchial, respiratory or asthmatic disorders, but 15% had some difficulties in this area. About one-fifth had acne, but this may not be too unusual for this age group. About one-half showed some conjunctival congestion (slight reddening of the eyes). The data on central nervous system function are somewhat ambiguous, but no clear indication of cannabis-related pathology appears. In this study, some subjects had not been abstinent for more than a few hours when the physical examination was carried out. Therefore, some of the conditions observed (especially cardiovascular and conjunctival) may have been residual reactions to acute intoxication.⁴⁸¹

In the continuing Addiction Research Foundation experimental cannabis program discussed earlier (see also Annex B) a variety of specific physiological measures were taken at regular intervals over a several-month period during which subjects (living on the hospital ward) smoked various doses of marijuana daily.⁴³⁶ In addition to general physical examinations, particular attention was given to EEG, to heart, liver and kidney function, and to a number of blood chemistry measures. Although these studies are not yet complete, some preliminary and tentative observations have been made. No evidence of physiological damage or medical complications from marijuana smoking has been detected in the program. Analysis based on visual examination of EEG records did not yield evidence of any significant change in brain wave patterns, but more comprehensive analyses are still in progress. Electrocardiogram (ECG) records showed some transitory changes in heart function, but chronic effects were not considered likely. There were

strong indications that the acute rise in pulse rate, which is a characteristic short-term effect of cannabis use, tends to be progressively less pronounced over several weeks of testing, even when doses are increased over time. No major changes in general sleep patterns were observed. Many aspects of the physiological data are still undergoing analysis. It should be restated that this program provides tentative information on the effects of daily administration of various doses of marijuana for periods of weeks or months. To this extent, chronic effects have been investigated, but the program was not intended to provide a simple basis for predicting possible consequences of many years of regular cannabis use. There may be some long-term effects which are not detectable until after a more prolonged period of heavy use than was studied here.

Reports of the effects of chronic cannabis use on the electroencephalogram (EEG) have been inconsistent. In the La Guardia report some abnormal EEGs were noted in regular users, but no overall consistent pattern was seen. The investigators concluded that these and other subjects examined "had suffered no mental or physical deterioration as a result of the use of the drug".⁴⁰⁷ Freedman and Rockmore came to a similar conclusion after examining over 300 long-term users in the army.^{201,202} Williams and associates' study of sub-chronic high dose daily cannabis use indicated little significant EEG change. The minor alterations seen in some cases disappeared after the drug was discontinued.⁶⁷⁰ Miras has reported several isolated cases of abnormal EEGs in heavy chronic hashish users in Greece, although no systematic controlled studies were done.⁴⁴²

Lundell has examined a number of multi-drug-using youths, and reports having found psychometric evidence of an organic brain syndrome in some of these individuals.³⁸³ Ebel studied 100 "hard core" multiple-drug-using adolescents in Germany. Three took only hashish and sixty-eight used hashish and LSD. The remainder used a variety of drugs intravenously—mostly opiate narcotics. In eighty subjects, abnormal EEGs were found which the investigators felt were the result of "direct drug damage".¹⁶⁷

In a recent British study, some signs of brain atrophy were reported in a small group of chronic users of cannabis and, often, 'speed' and LSD.¹⁰⁰ As the journal editors indicate, causal factors in this study are undetermined and many important variables remain to be explored.³⁴⁸ This paper has already stimulated considerable controversy in scientific and clinical circles.^{90,100,101,348,466,492,538,577,592,668} Although many researchers have been critical of certain aspects of the report's general methodology and conclusions, because of the serious nature of the neurological conditions suggested, careful controlled exploration of these possible drug effects should be given high priority, both in studies of human chronic users and primate animals.

In Alberta, Campbell found more abnormal EEGs in 22 cannabis users than in schizophrenic and neurological patients. Some of the cannabis smokers had used other psychotropic drugs, but this apparently did not correlate with the EEG readings.¹⁰² While in certain cases the EEG patterns observed in this study may have been a transient result of acute intoxication, it is unlikely that such effects could provide a complete explanation.

In a recent preliminary report of a controlled study of 31 chronic daily

hashish smokers in Greece, researchers found no indication of cannabis-related EEG abnormalities. These subjects had been using several grams of hashish per day for an average of 27 years. They were all employed and displayed no gross behaviour disorders. The study is continuing and final conclusions have not been drawn.¹⁸⁹ In a controlled study of behavioural functioning, Bowman found no psychometric evidence of neurological disorder in 30 long-term heavy marijuana users in Jamaica.⁷⁴ Another study of chronic *ganja* users in Jamaica is nearing completion, but no data have yet been released.⁵³⁵ A systematic study of a variety of measures, including EEG, is currently being carried out on a group of cannabis-using young people in Texas.^{31,32} No conclusive data are yet available from this study.

As noted earlier, chronic dementia, possibly reflecting an organic brain syndrome, has been described in a small proportion of chronic heavy hashish users in the East, although such reports have not been accompanied by adequate neurological or EEG data, or post mortem examinations, and no control groups have been employed. We have not yet been able to find any such cases scientifically documented in the Western literature. There are, however, a number of clinicians in North America who have suggested an organic quality in certain behavioural syndromes which seem to be associated with chronic cannabis use in some individuals.^{383,664}

The physiological and behavioural significance of the EEG patterns suggested in some of the above studies has yet to be determined. Controlled neurological research with chronic cannabis users is clearly indicated as a high priority research area. On balance, the existing evidence suggests that cannabis use does not generally result in serious neurological disorder.

Neurotoxicity to enormous daily quantities of cannabis, administered for weeks, has been demonstrated in animals, with rats being more sensitive than monkeys in this respect.^{386,605} The lowest of the doses used in these studies was approximately one hundred times the typical acute human dose. A cat study employing even larger doses showed EEG changes which persisted for weeks after discontinuation of the drug.³³ The usual difficulties with generalizing from animal experiments to humans are complicated further by the massive doses involved in these studies. This work should be extended to primates with more relevant drug quantities.

As noted earlier, there is no evidence that chronic cannabis consumption damages chromosomes or has other genetic effects in humans.^{162,226} Further evidence from a major study in Jamaica will soon be released.³⁸

In summary, the evidence as to the physiological effects of chronic use of cannabis is limited, varied, and conflicting. Modern, controlled studies are relatively recent and several are now in progress. Although no major effects have been established, existing information provides cause for concern in several areas. Respiratory and bronchial disorders will probably result from heavy chronic smoking of many crude substances and cannabis seems to be no exception. Whether or not carcinogenic effects might be involved has not been determined. The evidence on neurotoxicity is conflicting: while there appears to be no indication of neurological dysfunction with moderate use, the effects of heavy chronic cannabis consumption have not been clarified. Liver dysfunction has been suggested in some reports, but the bulk of the

evidence indicates that this is probably not a major risk. Effects on foetal development have been demonstrated in some strains of rodents but not in others, and there is currently no evidence that cannabis damages chromosomes or produces teratogenic effects in humans. Until further information is available, however, the use of cannabis, and most other drugs, should be avoided by pregnant women. Chronic cannabis use may produce a persistent 'blood-shot' eye appearance in some users, but this effect may be of aesthetic importance only.

TOLERANCE AND DEPENDENCE

Tolerance

Tolerance is said to develop when the response to the same dose of a drug decreases with repeated use. Gross tolerance to the major effects of cannabis does not ordinarily occur in humans with moderate or intermittent use, but there are many subtle aspects of this topic which have yet to be clarified. Although there is little tendency for intermittent users to increase dose, certain cannabis effects may be modified by repeated experience with the drug, and there is growing evidence that some tolerance develops with chronic use. It should be noted that the concepts of *tolerance* and *dose increase* are often mistakenly used interchangeably, when one does not necessarily imply the other. Tolerance may develop to the various effects of a drug at different rates and to different degrees. Self-administration of increased doses would not ordinarily be expected unless tolerance had developed to those specific aspects of the drug reaction which were reinforcing or rewarding its use. Tolerance or adaptation to some effects of a drug might occur independently from those responses which are sought by the user.

Many investigators have observed that in some individuals there appears to be a "reverse tolerance", or "sensitization" after initial use.^{41,248,314,358,576,578,661} In other words, smaller doses may produce the desired effects after the person has become familiar with the use of the drug. Many individuals reportedly experience little or no effect the first time they smoke cannabis. On the other hand, some persons appear to be extremely sensitive to the effects of cannabis from the first exposure, and may initially experience intense, ornate, and perhaps frightening reactions which are rarely, if ever, equalled with subsequent use. It is uncertain whether the alleged sensitization effect often reported is due to an initially poor smoking technique, some learning, conditioning, or psychological adaptation process (see previous discussion of Becker's work^{39,42}), the induction of enzymes producing an active metabolite, an accumulation of cannabinoids in the body over time, some molecular pharmacological receptor sensitization, or perhaps a combination of these. The actual nature of the change in response to cannabis which apparently occurs early after initial use has not been well documented or studied under controlled laboratory conditions.

As noted in an earlier section, the production of a psychoactive metabolite from a small quantity of injected THC has been demonstrated in humans. Mechoulam has suggested that THC metabolites may be responsible for the

major effects of cannabis in humans, and that the efficiency of enzymatic formation of the active compounds from THC in the body may be enhanced by a cannabis-induced increase in production of the appropriate enzymes.⁴²⁰ Such an effect might result in a subsequent increase in response to THC or, alternatively, it might also increase the rate of further metabolism and subsequent de-activation of primary active metabolites and reduce the overall reaction.

It has recently been demonstrated, using radio-active tracer techniques, that certain metabolites of THC may remain in the body in significant quantities for several days, or longer, after use.^{360,361} The possible role of this retention and possible accumulation of metabolites in the development of either sensitization or tolerance is unclear.

Several experiments have shown that experienced or heavy cannabis users may exhibit smaller reactions on certain physiological, behavioural and psychological measures than do novices or light users with standard doses,^{305,407,430,431,436,660} but others have not found such a difference.⁵¹⁹ There is evidence in Commission experiments of a complex relationship between the frequency of cannabis use and the overall response to marijuana, THC and placebo in the laboratory. Preliminary analysis suggests that drug reactions on some measures are significantly negatively correlated with frequency of use, while other variables exhibit no relationship and, in a few instances, greater responses occurred in the more frequent users. Further detailed analyses of these relationships are underway.

Some investigators have reported that regular users learn to direct or control some of the psychological and behavioural effects of cannabis while subjectively 'high', and may be able to perform a variety of behavioural or psychological tasks better than non-users given the same dose. Experience with the task while 'high' also apparently reduces drug-induced impairment. This would suggest that some sort of differential selective adaptation or tolerance may develop to some of the initially disrupting effects. Such an occurrence might reflect, in part, a behavioural adaptation to initially novel, distracting or disturbing stimulus aspects, rather than a direct physical tolerance. This notion is supported by the observation that the differential response to the drug by experienced users has been noted even after long periods of abstinence.⁴⁰⁷ An alteration in response which persists long after drug use is not a characteristic of "classical tolerance" and suggests that some learning factor is involved. Some users report that if they stay 'high' for several days in a row, the drug experience loses much of its freshness and clarity and, consequently, they prefer occasional use. Also, some regular users claim that certain subjective aspects of their typical 'high' have changed over several years of use.^{243,248,438} Intermittent users apparently remain sensitive to the reinforcing or rewarding effects of the drug, since there is generally no marked inclination for them to increase dosage. On the other hand, Jones reported that chronic users show a reduced response on subjective ratings, as well as on some physiological measures, when compared to infrequent users.³⁰⁵ Other investigators have not found evidence of a diminished 'high' in regular users.^{430,660}

Only a few direct experimental studies of chronic cannabis use and

tolerance in humans have been conducted. Williams and associates observed marijuana consumption in a group of prisoners given free access to the drug in a laboratory for over a month. Generally, large amounts were taken from the beginning and there was a small but gradual increase in the amount of marijuana consumed over time, and some change in the characteristic subjective and physiological effects were noted.⁶⁷⁰ Since no control group was included, certain aspects of this study are difficult to interpret. In a study in progress, Dornbush has found preliminary evidence of a reduced heart pulse rate response and perhaps some adaptation in cognitive function with daily use of a standard dose of marijuana, as compared to the initial acute reaction.¹⁶⁰ By contrast, in another continuing experiment, Hollister found no change in oral THC effects on several physiological, biochemical and psychological measures over a five-day period of daily oral THC consumption.²⁸¹ Several other chronic or sub-chronic experimental studies are underway in North America.^{428,626}

Data presented in the preliminary summary of the Addiction Research Foundation's experimental cannabis program provide evidence that certain kinds of tolerance to some marijuana effects may develop.⁴³⁶ A tendency was noted for a reduced acute pulse-rate response to marijuana doses given daily for more than a month. The work-output analysis discussed earlier suggests some adaptation or tolerance to the initial behaviour-disrupting or modifying effects of mandatory high dose use, as well. However, the question of tolerance to the rewarding or reinforcing aspects of the drug, which might lead to increased self-administration, cannot be clearly answered from the data provided. No attempt was made to quantify the magnitude or quality of the acute subjective response or 'high' obtained from the drug over repeated administration. In certain parts of the study, subjects were allowed to purchase and smoke additional marijuana. The data on free-purchase consumption, which is potentially most directly relevant, does not provide a complete picture. Under the mandatory smoking conditions studied, little additional marijuana was purchased and consumed by the subjects at any time, and in the completely optional, free-purchase periods, no suggestion of increased marijuana use over time occurred. In fact, subjects typically consumed less cannabis per day during free-purchase periods toward the end of the experiment than they did at the beginning. Tolerance to the reinforcing effects of the drug, and a subsequent increase in quantity or frequency of use, might occur with some individuals in other situations, but it does not appear to be a predominant characteristic of marijuana under conditions so far studied in the laboratory.

Recently a number of animal experiments have demonstrated definite tolerance to certain cannabis effects. Pigeons, dogs, rats and mice seem to be especially responsive, while rabbits are not.^{372,376,418} Tolerance to near-lethal toxic doses apparently develops quite quickly in some species. In dogs, tolerance to certain effects can be blocked by an enzyme inhibitor.⁴¹⁹ There is some indication that tolerance to THC may develop in response to other cannabis constituents independent of THC administration.²²⁷ Monkeys and chimpanzees have also shown some behavioural adaptation to chronic cannabis administration, which cannot be entirely attributed to "classical physical tolerance".^{186,417,605} Even in instances where considerable tolerance to

massive behaviour-disrupting and/or previously near-lethal doses have been demonstrated, no withdrawal symptoms have been noted in the animals when the drug was discontinued.^{418,419} Increased sensitivity, rather than tolerance, to repeated massive doses of cannabis in mice has also been recently demonstrated.^{192,225} The above experiments provide little information regarding tolerance to the potentially rewarding or reinforcing effects of the drug, and may not predict increased self-administration, even in the same species. The lack of suitable techniques for standard delivery of cannabinoids in animals has hampered self-administration studies.

There are reports of chronic, heavy cannabis users from the East who consume what would seem to be incredibly large quantities of the drug by Western standards.^{45,71,125,126,295,414,560,583} McGlothlin estimates that several hundred milligrams of THC are smoked per day by some of these individuals, although typical use is much lower.⁴¹⁴ Recently, the daily consumption of well over 100 mg of THC was noted in a group of chronic hashish smokers in Greece; acute smoked doses of 100 mg THC have been given these individuals without adverse reactions.^{443,444,445} Massive cannabis consumption by a few American soldiers has also been reported.^{139,601} In a Commission field study of regular cannabis users in Ontario, the median consumption per person over one hundred sessions (averaging several hours in duration) was approximately 6 mg THC, but in a few instances over 50 mg THC was apparently smoked.²³⁸ A comparable range of figures was reported by Jones in San Francisco.³⁰⁵ As noted in an earlier section, under controlled laboratory condition, it is often difficult to give more than 10–15 mg THC to light users, in an acute dose, efficiently smoked, without inducing some untoward reactions. Because of vastly varying styles of smoking, which affect the quantity of THC delivered to and absorbed by the user, these figures must be treated only as general estimates for comparison purposes. Even with this qualification, however, it is clear that considerable individual differences exist in capacity for cannabis consumption, even among regular users. On the basis of these data one cannot be certain to what extent this reflects a major degree of tolerance with heavy use in some individuals, natural variation in drug sensitivity or responsiveness, differences in desired effects or general drug-using norms, or a combination of these factors. It seems unlikely, however, that some of the higher acute doses noted here could be consumed without significant prior tolerance development. Consequently, until evidence appears to the contrary, experimental studies of cannabis-using standard doses should specify in detail the past drug-use history of the subjects tested.

Smith has suggested a “J-shaped” function relating cannabis tolerance to use. Light to moderate users may be able to reach a preferred level of effect at lower doses than novices. However, chronic frequent users appear to consume considerably larger acute doses than other individuals.⁵⁷⁶

Physical Dependence

Physical dependence is a physiological state of adaptation to a drug, normally following the development of tolerance, which gives rise to a characteristic set of acute physiological withdrawal symptoms (often called the “abstinence syndrome”), when administration of the drug is stopped.

Opiate narcotics, alcohol and barbiturates are examples of drugs which can produce severe physical dependence with heavy chronic use. Significant physical dependence on cannabis has not been demonstrated in humans or animals, and it would appear that there are normally no serious adverse physiological effects or withdrawal symptoms resulting from abstinence from the drug, even after long periods of uninterrupted use. Many investigators have noted that when chronic cannabis users are deprived of their drug, either by legal arrest or hospitalization, no severe effects occur and there are few complaints or demands for drug treatment.^{14,38,86,170,248,560} This is in sharp contrast to comparable conditions involving opiate narcotic dependents, alcoholics, etc. (See also the section on Adverse Reactions for comments regarding cannabis dependence in the United States armed forces.)

On the other hand, there have been a few isolated reports of rather severe reactions occurring after withdrawal of the drug in some chronic heavy users.^{47,200,651} While the great majority of reports of chronic users indicate little withdrawal response, acute abstinence symptoms that have occasionally been attributed to long-term heavy use in the literature include irritability, loss of appetite, restlessness and insomnia, sweating, mild gastrointestinal upset and headaches.^{69,124,131,295,401,560} Since hashish is smoked with large quantities of tobacco and other drugs in many countries, these mixtures may complicate the reactions noted in some reports. Recently, indications of tolerance and minor withdrawal symptoms have been noted among some chronic users in North America.^{305,582}

In Williams' experimental study of daily cannabis use, generally large quantities were consumed for a period of over a month. No significant withdrawal symptoms were seen with marijuana at the end of the experiment, but some abstinence signs occurred when the synthetic THC homologue, Pyrahexyl, was withdrawn.⁶⁷⁰ In the Addiction Research Foundation's experimental cannabis program no evidence of a withdrawal syndrome or other signs of dependence were seen, even after weeks of high daily doses which were considered subjectively aversive by the subjects.⁴³⁶

There is still some gap in our knowledge of the possibility of symptoms of dependence in individuals who might consume (either in the laboratory or 'on the street') even larger quantities of marijuana, throughout the day, for longer periods of time. There is little indication, however, that physical dependence on cannabis is a likely phenomenon under natural conditions.

Psychological Dependence

Psychological dependence, often called behavioural, psychic or emotional dependence, and habituation, is a much more elusive concept and is difficult to define in a satisfactory manner. A report in the *World Health Organization Bulletin* defined psychic dependence as follows: "In this situation there is a feeling of satisfaction and a psychic drive that require periodic or continuous administration of the drug to produce a desired effect or to avoid discomfort."¹⁷⁰ A major problem with this definition is the difficulty in operationally defining and objectively identifying the characteristics of the dependence in a practical situation. By contrast, some scientists have identified behavioural dependence as repeated self-administration of a

drug.⁶⁰⁶ This approach seems far too broad for most purposes, since it only indicates that the drug is in some way reinforcing or rewarding to the user, and merely restates the observation that he takes the drug. It has also been suggested that psychological dependence might be defined in terms of acute “behavioural withdrawal symptoms” (for example, anxiety, restlessness, or irritability) in a fashion analogous to the classical definition of physical dependence. This, of course, has the disadvantage of not allowing identification of the condition until drug use is terminated.

Extreme instances of psychological dependence are easier to identify and may be characterized by an intense craving or compulsion to continue the use of a drug, with obvious behavioural manifestations. In many instances, psychological aspects are considerably more important than physical dependence in maintaining chronic drug use. The major problem with severe amphetamine, opiate narcotic or alcohol dependence, for example, is not the physical aspect, since withdrawal can be successfully achieved in a few weeks, but the great likelihood that the individual will return to chronic use for psychological reasons.

Generally, even regular use of most drugs does not result in such intense psychological dependence. However, more subtle psychological and social factors usually have persistent effects in maintaining the behaviour of drug consumption.

A statement in the brief to the Commission from the Addiction Research Foundation of Ontario reflects the complexity of interpreting the question of dependency:

It should be recognized, however, that dependence is not necessarily bad in itself, either for the individual or for society. The question to be evaluated, therefore, is not whether dependence can occur, but whether dependence in a given case results in physical, psychological or social harm.⁷

The presence or absence of psychological dependence in a given situation depends on one's definition of the term. While many cannabis users in North America seem to take the drug once or twice a week, in a social context similar to that in which alcohol is normally consumed, and readily abstain for weeks or months with no ill effects, there is a small minority of users who smoke it daily, as a regular habit, and whose preferred routine and sense of well being are disrupted if they are unable to obtain the drug. There are reports from the East that considerable psychological dependence occurs in a minority of individuals in whom the acquisition and use of the drug have become a major component of their existence. Such habits are reportedly often difficult to discontinue.^{23,71,124,125,295,347,583}

Many users in North America apparently find cannabis pleasant and desirable, and often will go out of their way to acquire it—even at the risk of severe criminal penalty. In addition, there are several clinical reports of subtle adverse aspects of cannabis dependence in some chronic users on this continent.^{305,439,543,582} However, the craving and urgency associated with opiate narcotic, barbiturate, alcohol or tobacco dependence does not seem to develop.

A small study of regular daily users of both tobacco and marijuana suggests

some differences in the type of dependence which can develop with these two drugs—at least with present North American conditions. Subjects were asked which one drug they would prefer to use if they had to abstain from either marijuana or tobacco for different periods of time. All subjects indicated that in the long run they would prefer marijuana, and would choose to quit tobacco; when the required “abstinence time” was reduced to a day or less, almost all chose to use tobacco, since they felt it would be easier to do without marijuana for short periods than to go through the acute discomfort of tobacco withdrawal.⁴³⁸ Generally similar results were obtained from a Commission study of adult users of cannabis, tobacco and alcohol.²³⁹ Whether or not behaviour would actually coincide with these attitudes was not demonstrated. Furthermore, if marijuana were as freely available as tobacco, the patterns of preference or dependence might be altered.

CANNABIS AND OTHER DRUGS

Pharmacological Interaction

The interaction between cannabis and other drugs has only recently begun to be systematically explored. Most of the existing pharmacological research has been done on animals. Cross-tolerance among the cannabinoids has been demonstrated in some species.⁴¹⁸ In rodent studies, some cannabinoids have been shown to prolong barbiturate sedative and hypnotic effects and, paradoxically, to intensify amphetamine stimulant activity, probably through metabolic interaction.^{211,225,346,491,616} Cannabis increases alcohol effects on behaviour in mice^{192,240} but does not interact with diethyl ether (which is not metabolized in the body).²²⁵ Recently it has been shown by Manno and associates^{399,400} and by Commission research,⁵¹⁸ that in humans, cannabis and alcohol can have additive effects on certain psychomotor and physiological functions, and that marijuana may intensify the sedative properties of ethanol under some conditions. On the other hand, marijuana and alcohol may produce antagonistic effects on some subjective variables such as visual imagery.^{146,149,251,518} (Commission research suggests that these interaction effects can occur in the absence of any change in alcohol absorption, metabolism or excretion.⁵¹⁸)

Evidence of interaction between cannabis and other drugs has led to speculation that even though cannabis itself has very low lethal toxicity, high doses taken concomitantly with large quantities of sedatives, such as barbiturates and alcohol, or opiate narcotics may increase the likelihood of overdose effects with the latter drugs.^{489,490} Fernandes found in animal studies that cannabis had no significant effects on the lethal dose of alcohol, but increased sensitivity to barbiturate and morphine overdose, and reduced the toxicity of amphetamines.¹⁸⁵ No cross-tolerance has been found between THC and LSD, mescaline, psilocybin or opiate narcotics in animal and/or human studies.^{297,418,460} Cross-species generalizations from all of these reports must be limited, since the effects demonstrated may not apply to different animals or humans uniformly. Some cross-tolerance between cannabinoids and sedative drugs, such as barbiturates, minor tranquilizers and alcohol might exist in heavy chronic cannabis users, but these combinations have not been

scientifically explored in man. The discovery that THC is progressively metabolized by the same non-specific microsomal enzyme system in the liver as is involved in the biotransformation of many different substances, may be significant in the study of cannabis interactions with other drugs.

Stimulants are reportedly sometimes taken with cannabis to intensify certain effects and to negate the sedation some users experience with cannabis alone. It is said that DMT or DET are sometimes smoked in marijuana, but no such mixtures have been documented in Canada. Cannabis, as has been mentioned, is commonly taken with large quantities of tobacco in many countries, and in North America hashish is sometimes rolled into 'joints' with tobacco to facilitate burning. Possible interaction effects between cannabinoids and nicotine or other agents or irritants in the smoke from these plants have not been systematically examined. It is sometimes claimed that cannabis reduces some of the adverse aspects of opiate narcotic withdrawal,^{268,407} even though no significant cross-tolerance exists between these two classes of drugs. In addition, some 'speeders' reportedly smoke cannabis during their withdrawal to 'mellow the crash'. There is occasional mention in the 'underground subculture' that the juice from citrus fruit may counteract some aspects of the cannabis 'high'. The notion of a 'citrus antidote' to overdose effects is also mentioned in some of the older medical literature⁵⁴⁰ and reports from non-industrial countries, but has apparently not been systematically explored in the laboratory.

Patterns of Multiple-Drug Use

The majority of cannabis users studied in North America have had experience with a variety of other psychoactive drugs, alcohol and tobacco being the most frequently mentioned. The use of heroin, amphetamine and LSD is also much more common in cannabis users than in the general population.

Cannabis and alcohol. The relationship between cannabis and alcohol use has been the subject of much controversy. Some have suggested that cannabis may be a cure for society's alcohol ills. In general, survey studies of incidence of drug use find that those who use alcohol are much more likely than 'tee-totallers' to use cannabis, and that most cannabis users still drink alcohol. In addition, heavy users of cannabis tend to drink more alcohol than light or infrequent users.^{54,60,104,239,349,350,351,394,536,570,584,624} In a retrospective study of black males in St. Louis, a higher incidence of alcoholism and related problems was found among cannabis users than non-users.⁵²³ We have no information as to the effect cannabis had on an individual's drinking behaviour and overall alcohol intake in most of these studies, however.

Many researchers have mistakenly assumed that survey data indicating a positive *between-subject* correlation of cannabis and alcohol use, at a single point in time, implies a positive relationship between the use of the two drugs within an individual over time, which is the relationship of ultimate interest. This extrapolation is unjustified logically and statistically.¹¹⁷ Evidence of an association (either positive or negative) between the use of two drugs in a population at a given time provides little information as to the relationship

(if any) between the use of the drugs within the individual members of the group. Changes in behaviour, over time, within an individual must be studied directly. Even then, other secondary data in addition to drug use patterns must be considered in order to determine causal factors.

The bulk of the limited retrospective, *within-subject* data now available suggest that cannabis use may reduce or interchange with alcohol consumption in the user population. In many surveys, including several Commission studies,^{238,239,351} a substantial proportion of cannabis users claimed that they have significantly reduced their consumption of alcohol or quit it since using cannabis.^{247,248,415,493,554,682} There is a reported tendency, with cannabis use, for a greater reduction in the use of hard liquor than of the milder forms of alcohol. The combined consumption of cannabis with wine or beer is common in some social circles. Anecdotally, in certain parts of the United States, alcohol sales in university areas have reportedly declined as marijuana use increased, in spite of generally spiralling alcohol sales across the country.⁴⁷² Also of interest, five fraternities on a midwestern campus reported that the proportion of social funds spent annually on alcohol had been reduced considerably since marijuana use became common. No indication of alcohol abstinence appeared in these fraternities, however.⁴³⁸ None of these reports present definite, verifiable evidence of a reduction in alcohol use, and conclusions must be guarded.

Some cannabis users claim that alcohol effects dominate and, for that reason, they refuse to mix the drugs even if they enjoy each one separately. In several studies, however, where alcohol and cannabis were given separately or together in low doses under 'blind' conditions, some experienced cannabis users were not particularly proficient at identifying the predominant drug action.^{251,305,518} Differentiation is easier at higher doses, however, and alcohol does appear to reduce some of the 'psychedelic' aspects of cannabis.^{149,251,518}

It would appear that individuals who actually quit alcohol use because of cannabis reflect a minority of users, and their choice of drugs may have more to do with their particular value systems than with the pharmacological properties of the drugs. The hostile attitude towards alcohol expressed by some cannabis-using youth is clearly not reflected in the majority of cannabis users. Combined use is apparently becoming increasingly common. Systematic prospective studies have not been done, and it is not clear from the data whether, on a large scale, cannabis would tend to replace alcohol as an intoxicant in the user population, or whether the use of these drugs would be additive without significant interaction, or if the use of one might potentiate or increase the consumption of the other.

Comparing the benefits and harms of alcohol and cannabis has become a popular and engaging activity. Due to the profoundly different social connotations, patterns of use, and scientific knowledge of these drugs, such a comparison must be made on limited and tenuous grounds. (In addition, only a few experimental studies have been done directly comparing cannabis and alcohol in humans.^{108,267,282,305,308,397,440,518,573})

Cannabis and tobacco. In North America, marijuana use has traditionally been closely tied to tobacco use and there seem to be relatively few regular

cannabis smokers who did not initially learn the technique of inhaling smoke from prior experience with tobacco cigarettes. In some areas of North America the majority of tobacco smokers have also used cannabis. While the smoking of tobacco leaf does not necessarily precede or lead to the similar use of cannabis, the temporal sequence is commonly observed and must be considered in any serious investigation of the proliferation of drug use today. A pharmacological "progression" from tobacco to cannabis has been suggested,⁵³¹ but is not considered a likely direct causal factor, and there is no scientific evidence that one drug creates a need for another.

The importance of a "smoking barrier" in the spread of drug smoke inhalation has been given considerable attention.^{60,195,243} Because the inhalation of smoke is initially difficult and unpleasant for the novice and usually requires considerable practice and control of natural reflexes, the problems of learning the technique of smoking might be considered a general barrier against this mode of drug administration. Many observers feel that after one has acquired the seemingly unnatural and originally offensive practice of smoke inhalation and learned that the effects can be rewarding or pleasurable, the general "smoking barrier" is removed and the smoker is then more likely to try smoking other drugs.

Blum has presented considerable evidence that before the world-wide "epidemic" spread of tobacco use, the intentional inhaling of the smoke from burning substances, as a mode of drug administration, was not popular in most parts of the world. The smoking of opium in China and India, for example, only occurred after tobacco was introduced from the West to the Orient, and for some time opium was smoked in conjunction with tobacco.⁵⁹ Cannabis, even today, is rarely smoked alone in Eastern countries. In India, hashish and marijuana are invariably mixed with large quantities of crude tobacco for smoking.^{126,295} The smoking of cannabis was not common before tobacco was introduced. It would appear then, that although cannabis was previously consumed in other ways, the past and present practices of smoking cannabis in most cultures is directly and causally linked with the assimilation of tobacco smoking practices from the Western Hemisphere.

Progression to heroin and other drugs. In the past two decades, the relationship between cannabis and heroin has been the subject of heated controversy in Western literature. During this period, reports from the United States indicated that the majority of heroin users studied had previously used cannabis, although in certain sections of the country (noticeably the southeastern states) this was not the case.²⁸ Before 1950, there was little evidence or serious discussion of a cannabis-to-heroin progression. Similarly, until recently in Canada, there appeared to be no relationship between the use of cannabis and heroin. Heroin users studied were generally heavy consumers of alcohol, barbiturates, and tobacco, but had little or no cannabis experience.^{588,671} The situation has apparently changed, and many young Canadian heroin users report previous and concomitant use of marijuana, amphetamines and LSD.³⁰²

Several studies in the United States of persons arrested for cannabis offences, or noted for other delinquent behaviour, indicate that a significant number of these individuals were later arrested on heroin offences.^{99,228,506} In

some instances, however, the critical contact with heroin users and sources came from a prison experience.²⁸ Robins reported that one-fifth of a group of blacks in St. Louis who were users of cannabis in the 1940s had admitted to subsequent heroin use.⁵²³

Paton used a Bayesian formula employing various estimates of the incidence of cannabis and heroin use in the general population and in the sub-population of heroin users in England, to predict that seven to fifteen per cent of cannabis users will try heroin.⁴⁸⁸ The appropriateness and accuracy of the figures used in the formula and their applicability to the present situation are highly questionable. The proper use of Bayes' Theorem in this application requires accurate estimates of the incidence of drug use in the various populations described, at a single point in time. Good epidemiological data meeting these criteria were not available in England, and some researchers have suggested that if other, apparently equally justifiable, estimates had been employed, rather than those used by Paton, the resulting prediction of heroin use among cannabis users would have been substantially lower.^{243,544} In any event, even estimates derived from the proper use of the statistical formula can be considered valid only as long as the social and epidemiological conditions associated with the use of both drugs remain constant. These requirements call into question the general value of Bayes' Theorem in those areas of science dealing with rapidly changing social phenomena.

Studies based on lower-class and/or delinquent populations do not readily generalize to the present phenomenon of middle-class cannabis consumption. In middle-class cannabis users it would appear that only a small minority have experience with opium and even less with morphine and heroin. However, an increase in opiate narcotic use in the younger middle-class groups in Canada has been reported.

A similar controversy exists regarding the role of cannabis in the use of amphetamines and LSD. Most chronic users of these drugs report earlier experience with cannabis and illicit, heavy use of alcohol and tobacco, as adolescents.

In North American studies, peer group values and the establishment of contacts with illicit drug distribution networks have played a major role in concomitant and sequential illegal use of different drugs. Becoming accustomed to "breaking the barrier" of illegal drug use by the consumption of one illicit drug may reduce, in some individuals, inhibitions with respect to other such drugs. It has been proposed that cannabis often provides the initial drug in this context. Although previous heavy illicit use of alcohol during adolescence is common in adult chronic drug users, drinking by young people, even though illegal, is largely condoned and, to some extent, encouraged by our society; it does not have the legal significance that cannabis use has. Some have suggested that through the use of cannabis certain, perhaps predisposed, individuals may learn the use of drugs as a mode of coping or as a simple primary source of reinforcement and satisfaction, and that this lesson might later generalize to other drugs. Many argue that persons who ultimately become dependent on opiate narcotics, 'speed' or other 'hard' drugs are strongly predisposed in that direction by personal, social and economic factors and that the use of cannabis as a

transitional drug is of little causal significance. Attempts to identify and establish these predisposing factors have met with little success, however, and this interesting hypothesis has yet to be confirmed scientifically.

In summary, a positive statistical relationship exists between the use of cannabis and a variety of other psychoactive drugs. Marijuana is often the first illicit drug (other than alcohol and tobacco in adolescence) taken by multi-drug users. The role of cannabis, if any, in the progression to other drugs is not yet well understood; it is unclear whether it plays a specific predisposing role, or is causally unrelated to other drug use and is often used earlier simply because of its wider availability and social acceptance. Specific pharmacological properties of marijuana (or any other drug) which might lead to a need or craving for other drugs have not been discovered. It would appear that dynamic and changing social and personal factors play the dominant role in the multi-drug-using patterns reported, and that the specific pharmacology of the compounds involved is secondary.

ANNEX A

PRELIMINARY SUMMARY OF COMMISSION CANNABIS AND ALCOHOL EXPERIMENTS

The Commission has undertaken four experimental projects concerning the acute effects of cannabis and, in some cases, of alcohol on humans. These experiments were designed to fill gaps in the literature in certain critical areas. We were especially interested in the acute effects of cannabis on the functioning of 'normal' users at doses that are socially relevant for Canada today. The purpose of this summary is to supplement the presentation of the findings in the text. The reader is referred to the previous sections of this chapter for discussion, conclusions, general perspective with respect to past literature, current projects, and areas of future attention related to these research areas. Of particular relevance is the previous discussion of dose. This preliminary summary deals with the major aspects of our experimental program. Although the primary results of these experiments have been established, further comprehensive analysis is underway, and a final detailed description of the experiments (with complete statistical procedures^[r]) will appear in a supplement to this report.

One experiment was designed to provide a quantitative comparison of the effects of synthetic Δ^9 THC and natural marijuana in humans, and to establish dose- and time-response relationships with these substances on a number of physiological and psychological measures.⁴⁴⁰ A second experiment sought to determine the effects of cannabis and alcohol on some automobile driving tasks.²⁵¹ The purpose of the third study was to examine the effects of cannabis, alcohol, and their combination on psychomotor tracking performance.⁵¹⁸ The fourth project was concerned with the effects of cannabis on visual signal detection (attention and vigilance) and, secondarily, the recovery of visual acuity after exposure to glare.

⁶⁰³ In all four experiments, subjects were paid volunteers, mostly university students. The subjects were psychiatrically screened, and those with detectable pathology were excluded. Subjects were all experienced with alcohol and cannabis, but not heavy users of either, and had had minimal experience with other psychoactive drugs. No heavy tobacco smokers were included.

A common supply of marijuana, kept frozen under nitrogen, was used for all experiments. Each cigarette was packaged in a nitrogen-filled container and kept frozen until being administered to the subject. Many other conditions of our experiments were standardized and were common to all these projects, thereby allowing considerable between-study comparison and a common data base for certain variables.

EXPERIMENT 1: A COMPARISON OF Δ^9 THC AND MARIJUANA EFFECTS IN HUMANS⁴⁴⁰

A variety of chemical and pharmacological data support the contention that Δ^9 THC is the principal active constituent in cannabis (at least in part via metabolites). There has been an almost complete reliance on the Δ^9 THC

content of cannabis to provide the basis for standardizing various samples and comparing the results of different experimental and social studies, even though the pharmacological equivalence of different cannabis preparations accomplished by this process has not been adequately tested. In fact, no direct quantitative comparison of the effects of relatively pure isolated or synthetic THC and crude cannabis preparations or other cannabinoids has previously been conducted in humans. Furthermore, there are increasing suggestions in the literature that a single isomer of THC may not account for all of the major effects of cannabis.

This project was designed to compare the effects of high purity synthetic Δ^9 THC with natural marijuana as a further step in determining the active constituents of marijuana in humans. Of comparable interest, acute dose- and time-response functions were obtained on a number of subjective, behavioural and physiological measures.

Procedure

Fourteen male subjects each attended eight weekly experimental sessions which were six hours in duration. Each subject was assigned a specific time and day of the week for all sessions. After a no-drug practice session, seven experimental conditions were given to all subjects in a double-blind Latin square design as follows: Placebo (extracted alfalfa); three levels of marijuana (9, 21, and 88 mcg Δ^9 THC per kg body weight, giving average doses of 0.7, 1.5, and 6.2 mg Δ^9 THC); three equivalent doses of high-purity synthetic Δ^9 THC on extracted alfalfa. Subjects always received a standard 0.4 gram cigarette containing a varying ratio of cannabis to extracted alfalfa material, as appropriate to the condition. The highest marijuana dose was intended to approximate the effects typically sought by regular cannabis users in North America. The lowest quantity was given in an attempt to establish a threshold dose, as suggested by pilot studies and evidence in the literature.

Considerable problems were encountered in obtaining adequate quantitative cannabinoid content figures on the two drug samples. Delta-9 THC values obtained from a variety of authorized laboratories in Canada and the United States differed in the extreme by several hundred per cent. Discrepancies in THC content estimates were finally resolved in an apparently satisfactory manner and the experimental work was begun.^[p] Delta-9 THC made up more than 90% of the cannabinoids in the marijuana sample. Consequently, the study cannot provide information regarding cannabinoids other than Δ^9 THC or possible cannabinoid interactions.

The smoking technique employed was standardized and closely controlled. A five second smoke inhalation was followed by a brief air inhalation period, and the smoke was retained in the lungs for a total of 25 seconds. A 20-second rest period followed exhalation. This cycle was repeated until the entire cigarette was consumed including the butt. On the average, this took about ten minutes. On the basis of available evidence, it would appear that with our standard administration technique nearly all of the THC delivered in the smoke was absorbed. Subsequent to the pharmacological studies, 24 cigarettes, comparable to those used in the main experiment, were smoked by machine using the same timing schedule.¹⁸⁰ This experiment suggested that

the actual THC delivered to the subjects in the smoke was 53% and 48% of that originally in the marijuana and THC-alfalfa cigarettes, respectively. Consequently, in spite of the fact that the cigarettes in the THC and marijuana conditions contained matched quantities of Δ^9 THC, there was apparently a 10% difference in the dose delivered. This discrepancy has been taken into account in the following discussion.

On the basis of a review of the literature and preliminary laboratory work, a condensed test battery was constructed to assess most of the major acute cannabis effects previously indicated and to attempt to tap some of the prominent features of the 'high' as reported by users. The time required to complete the test battery was just over two hours, and with the exception of a few measures, the battery was repeated four hours after smoking. The various tests were given in the same order in all conditions. While there are certain practical and statistical advantages to this fixed procedure, it means that the differential sensitivity of the various measures to cannabis effects is confounded with time-response effects. Certain tests, given near the end of the battery, in which little or no change was detected may have shown changes if they had been given immediately after the drug administration. In most cases, however, the major part of the 'high' resulting from the highest dose lasted throughout the first testing period of the test battery.

The following measures were included in the test battery: heart pulse rate; salivation; conjunctival injection (reddening of the eyes); finger temperature; tonic skin conductance of the fingers (a measure of sweat gland activity); visual imagery (visual impressions with eyes closed in total darkness); autokinetic movement (apparent movement of a stationary point of light in an otherwise dark room); two-flash fusion threshold (the shortest time interval between two brief light flashes at which they are still perceived as two); spiral after-effect (the duration of visual distortion which follows viewing a rotating spiral); time production (the ability to specify 15-second intervals during a distracting task) and time estimation (the perceived duration of the visual imagery, painting and speech tasks); one-minute sustained finger grip; maximum momentary strength of hand grip; maximum tapping speed (the total number of taps made with a hand-held pencil-like stylus in a one-minute period); short-term serial position memory (after a series of nine different digits were presented, a tenth digit was given and the subject was asked to note the position in which that number appeared in the original series); digit symbol substitution (the number of correct code and symbol substitutions written during a 90-second interval); finger painting (scored with respect to a variety of psychiatric, graphic, and aesthetic variables); speech sample (a three-minute description of TAT pictures—data not yet fully analysed); Clyde Mood Scale¹³⁵ (a questionnaire which measures six different mood dimensions); Royal Highness Inventory (RHI) (a multiple-choice questionnaire designed to assess some subjective effects of cannabis); How High Scale (a rating form on which the subject rates his usual "high" and how "high" he currently is on a scale between "not high" and the "highest you have ever been", successive points are recorded by the subject on a single graph at several times throughout the experimental session so that a time-response curve of the intensity of the subjective "high" is plotted); Post-Session Questionnaire and Morning-After Questionnaire (a variety of items relating

to possible cannabis effects, filled out by the subject at the end of each session and on the morning following each session, respectively).

Results

No consistent qualitative or quantitative differences were found between the marijuana and the pure Δ^9 THC on the various measures described above. Tests that showed clear dose- and time-response effects with the natural marijuana, produced very similar results with the synthetic THC. Likewise, measures that showed little effect due to the marijuana revealed minimal response to the THC alone. In the following discussions, "cannabis effects" represent both the marijuana and the pure THC drug conditions.

Cannabis resulted in an obvious increase in pulse rate and conjunctival injection, and a decrease in salivation and finger temperature. For the highest dose, pulse rate was an average of 33% higher than in the placebo condition at five minutes after smoking, 19% higher at one hour, 15% higher at 1½ hours, 6% higher at four hours, and not clearly different at five hours after smoking. Likewise, salivation decreased markedly after smoking the highest dose, with the effect being less pronounced at 1½ hours, and not clearly detectable more than four hours after smoking. The highest dose resulted in an increase in conjunctival injection and a decrease in finger temperature within one hour after smoking, but not at 4½ hours when a second measure was taken. The medium and lowest cannabis doses resulted in effects on these physiological variables that were progressively smaller in magnitude and shorter in duration than occurred with the highest dose.

An increase in visual imagery and autokinetic movement, and a decrease in two-flash fusion threshold resulted from the cannabis, as compared to the placebo condition. Estimates of the time spent in the visual imagery, speech, and painting tasks were longer with cannabis than with no drug; the cannabis resulted in over-estimates of clock time, while under-estimates of clock time were usually observed in the placebo condition. These effects, which were dose-dependent, were observed within a two-hour period following smoking. The drugs did not result in a change in 15-second time interval production (measured 15 minutes after smoking) or in the spiral after-effect (measured 30 minutes after smoking). In the second presentation of the test battery (which did not include speech and painting time estimations), no substantial cannabis effects on any of these variables were observed.

The cannabis resulted in a less forceful finger grip over a one-minute interval than occurred in the placebo condition. A lower level of sustained force was also observed at both 1½ and 4½ hours after smoking. No drug effect was found on the momentary maximum strength of hand grip, or the maximum speed of stylus tapping.

An impairment in short-term serial position memory resulted from the highest dose of cannabis. The effect was observed within 15 minutes after smoking, but not at the time of the second measure, four hours after drug administration. Cannabis did not affect performance on the digit symbol substitution or finger painting measures, both of which were obtained relatively late in the experimental session (1½–2 hours after smoking).

The subjective measures were generally found to be sensitive to cannabis, although subjects displayed a rather wide range of response to the doses administered. How High Scale ratings that were made immediately after smoking indicated that the highest dose made the subjects feel, on the average, about as "high" as they typically feel when they use cannabis. The lower doses produced less effect. The second rating, taken about one hour after smoking, was somewhat higher than the initial score for the two upper doses, but lower for the lowest cannabis dose and the placebo. Subsequent ratings declined for all doses during the remainder of the session, with the effects of the highest dose lasting longer than the lower two. The Royal Highness Inventory (RHI) scores, measured at five minutes and at two hours after smoking, also increased as a function of dose. Five hours after smoking, the How High Scale ratings and the RHI scores obtained in the highest dose conditions were slightly (yet still significantly) elevated compared to the placebo condition. The Clyde Mood Scale (CMS) scores, measured 1½ hours after smoking, indicated that the highest cannabis dose resulted in a decrease in "clearthinking". This finding was reflected in both the subjects' and the experimenters' ratings on such items as "efficient", "alert", "able to concentrate", and "business-like". None of the other five CMS dimensions reflected drug effects. Five hours after smoking, there was an increase in the CMS factor "sleepy" following the highest dose, but no difference in any of the other dimensions. In the Post-Session Questionnaire, the subjects typically rated the amount of marijuana received as "quite a bit" for the highest dose condition, as "a moderate amount" for the middle dose, as between "a moderate amount" and "very little" for the low dose, and as "very little" in the placebo condition. On the Morning-After Questionnaire, after the placebo condition the subjects usually reported feeling "about average" between the time they left the experiment and the time they went to bed that evening, while after cannabis sessions there were more reports of feeling "very well" during the same period. No other indication of prolonged cannabis effect occurred. No signs of hangover were noted the next morning.

Cannabis threshold. Our lowest dose was intended to approximate a minimally effective quantity of cannabis. On the conjunctiva, saliva and Post-Questionnaire measures there was a significant difference between the low dose and the placebo condition. Moreover, all of the other variables that showed substantial effects from both the medium and high doses (pulse rate, How High Scale, RHI and visual imagery) also showed average scores in the low dose condition that were different from the placebo in the same direction. Overall, the data indicate that the low dose did have some pharmacological effects even though they were very slight and close to the threshold of measurable subjective and objective response. If we are correct in assuming that approximately 50% of the THC dose in the cigarettes was actually absorbed by the subject, these data suggest the human threshold for THC effects is lower than previously thought (apparently less than 4.5 mcg/kg THC absorbed).

Discussion

Our data show cannabis dose- and time-response effects on a variety of physiological, perceptual, cognitive, psychomotor, and subjective functions. Cannabis effects on most of these measures were detected early following smoking and, for the most part, were minimal three to five hours later.

The fact that our crude marijuana and synthetic Δ^9 THC had very similar effects on the various measures does not completely rule out the possibility that other psychoactive substances might be present in this or other strains of marijuana. It may be that the relatively high THC content of our marijuana obscured minor effects due to substances that were present only in small amounts. It is also possible that our tests were not sensitive enough to show slight differences in drug effects, or that we did not give the appropriate tests to detect such differences. However, the data do strongly support the hypotheses that Δ^9 THC is the major active constituent of marijuana in humans. It also appears that synthetic THC is functionally equivalent to the natural plant product, and that THC content is probably an adequate basis for standardization of cannabis preparations. But possible interaction between THC and other cannabinoids (for example, CBD and CBN) in the areas of metabolism, protein-binding, etc., as well as possible direct effects of other cannabinoids in high doses, remains to be explored. Such follow-up work had been anticipated as part of this project, but had to be abandoned due to time limitations. Until further comparative analysis is done with other cannabis samples (for example, hashish and other marijuana strains), it would be prudent to specify CBD and CBN as well as the THC content of cannabis in experimental situations. In addition, if oral administration is used, the carboxylic acid forms of these cannabinoids should also be specified.

In this experiment, extracted alfalfa was used as placebo. In the other three experiments which follow, hexane-extracted marijuana (of a different strain than the active material) served this control function. In all four studies, cigarettes were smoked under identical conditions using similar subjects, and no evidence of a differential response to these two different placebo materials was obtained. There was, consequently, no suggestion of cannabis-like activity in non-cannabinoid substances remaining in the marijuana after hexane extraction.

It should be stressed that our research was focussed on acute effects and can provide only suggestive evidence regarding the equivalence of THC and marijuana in chronic use. Other substances, which elicit little short-term response, might contribute, over time, to possible effects of long-term use.

EXPERIMENT 2: EFFECTS OF MARIJUANA AND ALCOHOL ON SOME AUTOMOBILE DRIVING TASKS²⁵¹

Existing literature indicates that under certain conditions cannabis can produce significant alteration in attention and certain other perceptual and cognitive processes. The results of psychomotor tests and driving simulator studies have been somewhat inconsistent, but tend to show some decrement due to cannabis. Available epidemiological data in North America do not indicate that cannabis has contributed significantly to traffic hazards to date,

however. This may, in part, be a function of restricted intensity and frequency of use. The following study was intended to explore the possibility of cannabis effects on certain driving tasks. It was not intended, however, to provide a direct basis for generalizing to cannabis-related traffic hazards as a whole. Many other relevant variables remain to be measured.

Procedure

This project is divided into two separate but related studies. In the main experiment, 16 licensed drivers (4 females and 12 males) each attended four weekly experimental sessions in addition to a preliminary no-drug practice session. The four experimental conditions, given to all subjects in a double-blind Latin square design, were: Placebo (extracted marijuana, and a non-alcoholic drink); two levels of marijuana (21 and 88 mcg Δ^9 THC per kg body weight, producing average doses of 1.4 and 5.9 mg Δ^9 THC); and one dose of ethanol (producing an average blood alcohol level of 0.07%—the equivalent of about three cocktails). Subjects always received a standard drink followed by a 0.4 gram cigarette, each with or without drug, as appropriate to the condition. The cigarettes were smoked following the same schedule described for Experiment 1. In these experiments blood alcohol level (b.a.l.) was measured with a Breathalyzer.

Subjects began the first driving trial, consisting of six course laps (about 6 minutes each), directly after smoking. Each lap involved driving through a 1.1 mile course which included both slow forward and backward manoeuvring and higher speed (about 25 mph) straight and curved sections, marked out with wooden poles and plastic cones. In one section of the course the subjects were asked to maintain their speed at 25 mph. For the other sections the subjects were instructed to drive as quickly as possible without making too many hits or awkward movements, and without exceeding 30 mph at any time. A second trial (three laps) started three hours after smoking. The subject's driving was scored on: hits of cones and poles, rough handling (superfluous or awkward movements) and speed. Supplementary physiological and psychological measures were also obtained during the session.

A separate sample of 12 subjects (three females, nine males), experienced with alcohol but not cannabis, were given only the alcohol and placebo drink conditions, and were tested on only one trial consisting of six laps. Course and rating conditions and practice trials were the same as described for the main study.

Results

Both the alcohol dose and the higher dose of cannabis were found to result in poorer car handling performance. During the first trial, significantly more hits (of cones and poles) resulted when subjects received alcohol or the higher dose of cannabis than when they received only the placebos. The mean number of hits per lap was 13.2 in the placebo condition, 16.8 in the higher cannabis condition, and 17.4 in the alcohol condition. There was no difference between the number of hits made in the low cannabis and placebo conditions. In the second trial, given three hours after smoking, the number

of hits in the alcohol and higher marijuana conditions had decreased to a level approaching that of the placebo condition. Rough handling tended to be greater after drug treatment than in the placebo condition, although only the alcohol scores appeared significant.

Driving speed was affected by the higher dose of cannabis. In the first trial, subjects drove slower in that condition than when no drug was given. The difference was small (about 1.5 miles per hour or 7%) but consistent. Driving speeds in the alcohol and low cannabis conditions were not significantly different from placebo. In the second trial, differences in driving speed among the four experimental conditions were only slight.

Thirteen of the 16 subjects reported that they were experienced in driving in normal traffic after smoking cannabis or drinking alcohol, while three had never done so. Of the 13 experienced subjects, all but one reported having driven when feeling at least as 'high' as they felt when getting the lower cannabis dose, while seven reported having driven when feeling at least as 'high' as they did after getting the higher cannabis dose. Eleven of the 13 subjects had driven when feeling as 'high' as they felt after getting the alcohol dose. Ratings made before and after the first driving trial indicated that the higher dose of cannabis made most subjects feel as 'high' or a little 'higher' than they typically get from the drug. The alcohol ratings were somewhat more varied, but they suggest a similar situation for that drug. For both the alcohol and the upper cannabis dose the subjects rated their driving ability as lower than they did in the placebo condition. Moreover, they felt that driving took more effort after either drug, and that normally they would be less likely to drive when feeling as they did.

Pulse rate, visual imagery, Clyde Mood Scale ratings and Royal Highness Inventory measures were also taken during each session. The cannabis resulted in an increase in pulse rate that was of a similar magnitude and duration as that observed with the same doses in Experiment 1. The alcohol resulted in a smaller but more prolonged increase in pulse rate. Measurements taken immediately after driving indicated that the driving effort resulted in a slight increase in pulse rate, but that the change was similar under the various treatment conditions. An increase in eyes-closed visual imagery was found with the higher cannabis dose, as in Experiment 1. There was a tendency toward decreased imagery in the alcohol condition compared to placebo. The Clyde Mood Scale ratings indicated a decrease in "clearthinking" due to the alcohol and the higher dose of cannabis. Also, alcohol resulted in a decrease in the factor "unhappy" and an increase in the "friendly" score. The cannabis resulted in Royal Highness Inventory (RHI) scores that were comparable to those observed with the same cannabis doses in Experiment 1. The RHI scores also increased in the alcohol condition, but to a lesser extent than occurred with the higher cannabis dose.

The subjects in the second study, who were given only the alcohol and placebo conditions, showed alcohol effects which were similar to those found in the main experiment.

Discussion

These results show a decremental effect of both the higher cannabis dose and the alcohol dose on car handling performance. The fact that there were no major drug differences in the rough handling score, rated by the observer in the car, suggests that the drug effects on performance, at the doses used here, are not dramatic. It would be premature to predict from these results whether or not cannabis does or will have serious effects on traffic safety. This initial study only measures car handling in rather artificial circumstances. For example, the difficulty and risk involved in traffic was not represented in the test situation, and there was no explicit penalty for making errors, unlike normal driving conditions. In addition, subjects were always aware that they were performing and under observation. These results do serve to point out the possibility that cannabis may adversely affect traffic safety and to underline the urgent need for extensive research into this question. The reader is referred to the text of the section on Psychomotor Performance and Driving for further discussion and interpretation.

EXPERIMENT 3: EFFECTS OF MARIJUANA AND ALCOHOL ON PSYCHOMOTOR TRACKING PERFORMANCE⁵¹⁸

The effects of cannabis on psychomotor performance have been shown to be related to dose, frequency of use, and task complexity and familiarity. Also, there are suggestions from some human and animal data that cannabis and alcohol may have additive effects on certain functions, including psychomotor performance. Some attempts have been made to predict the influence of cannabis on automobile handling and other common tasks by investigating performance on certain laboratory psychomotor measures, but the predictive validity of such tests has not been demonstrated. This study represents an attempt to obtain basic information about the effects of cannabis and alcohol, alone and in combination, on tracking performance. Secondly, the effects of these drugs on visual perception and several other physiological and psychological variables were also investigated.

Procedure

Twenty-two male subjects each attended six weekly experimental sessions in addition to two preliminary no-drug practice sessions. The six experimental conditions (given to all subjects in a double-blind Latin square design) were: Placebo (extracted marijuana and a non-alcoholic drink), two levels of marijuana (21 and 88 mcg Δ^9 THC/kg, giving average doses of 1.6 and 6.8 mg Δ^9 THC), two levels of alcohol (0.07 and 0.03% blood alcohol level), and the low marijuana and low alcohol doses combined. Again, subjects always received a standard drink followed by a 0.4 gram cigarette, each with or without drug as appropriate to the condition. Subjects followed the same smoking schedule as described in Experiment 1.

Following smoking, subjects began the first trial consisting of six tracking runs (three minutes each). A 20-minute break occurred between the third and fourth runs, during which supplementary measures were taken. In the tracking task⁵¹⁷ the subject sat in front of an 8x10-inch screen which displayed a

fixed central horizontal target line and a small circle which continuously moved up and down in a random fashion when the tracking control was at rest. Forward and backward movements of a hand-operated "joy stick" changed the rate and direction of the circle movement in proportion to the stick deflection. By such deflections the subject could compensate for the signal fluctuations, and was asked to keep the circle as close to the target line as possible. The distance between the circle and line was the *error*, and a score was calculated for each three minute run based on the integral of the square of the error divided by the integral of the square of the amplitude of the input signal. The larger the error, the higher the score. In addition, for simple tracking (see below) the subjects' dynamic response was described by simple, linear differential equations, called "describing functions".

In four of the six tracking runs the subject was required only to perform the compensatory tracking (simple tracking). In the other two runs (complex tracking) two additional complications were added to the task: (1) Three times in each run the control dynamics between the "joy stick" and the circle were reversed unexpectedly (that is, it became necessary to push in order to get the circle to move in the direction that had earlier been achieved by pulling, and vice versa). Performance on this task was measured by the speed of reaction and adaptation to the polarity change. (2) Four other times in each run the number 1, 2 or 3 appeared without warning on an electronic tube above the target screen. The subject was required to push a left or right pedal, or continue pushing a middle pedal with his foot depending on which of the three numbers appeared. Performance on this task was measured by the speed of foot choice reaction, as well as the number of times the subject either failed to respond on cue (false negatives) or responded when he should not have (false positives).

A second trial consisting of two simple tracking runs and one complex run was started four hours after drug administration. The secondary physiological and psychological measures were obtained during periods when the subject was not tracking.

Results

In the first trial, the alcohol and, less consistently, the upper cannabis dose, resulted in an increase in tracking error scores, indicating impairment in both simple and complex tracking. The effect was greater for the higher doses than for the lower doses of each drug. The high alcohol dose resulted in significantly more tracking error than resulted from cannabis. The combination of low cannabis and low alcohol produced greater error scores in complex tracking than resulted from the corresponding doses of each drug given alone. Interpretation of the subjects' "describing functions" obtained on simple tracking runs indicated that the alcohol resulted in an increase in "effective reaction delay time" in the subjects' continuous tracking performance, and an increase in "random output uncorrelated with input". These effects increased with dose. Examination of the "describing functions" for cannabis revealed a dose-dependent increase in "random output uncorrelated with input", with the effect due to the higher cannabis dose roughly equivalent to that of the lower alcohol dose. The cannabis did not result in a change

in "effective reaction delay time" or other aspects of the "describing functions". The combination of alcohol and marijuana resulted in an increase in "random output uncorrelated with input" that was not substantially greater than that found with the same low doses of each drug separately. "Effective reaction delay time" in the combination condition was not noticeably different from that observed with the alcohol dose given alone.

Foot choice reaction time was faster in the placebo condition than in any of the drug conditions; however, only the decrement due to the higher alcohol dose was significant. Neither cannabis nor alcohol, nor the combination of the two, resulted in a tendency to miss signals or to respond at the wrong time on this secondary attention and reaction time task. Reaction time to tracking control polarity reversals was reliably longer with the higher dose of alcohol compared to placebo, but no significant effects were seen in the other drug conditions. Speed of adaptation to tracking polarity change has not yet been completely analysed. No major drug effects on psychomotor performance were observed on the later trial which was given four hours after drug administration.

The subjective ratings of intoxication during the period of the first trial indicated that the higher doses of alcohol or cannabis typically made the subjects slightly "higher" than they usually get when using these drugs. The lower cannabis or alcohol doses made them feel somewhat less "high" than they typically get. The combined alcohol-cannabis treatment resulted in alcohol ratings that were similar to those obtained when the low alcohol dose was given alone, and cannabis ratings that were similar to those obtained when only the low cannabis dose was given. While the subjects were able to discriminate which drug or drugs were given in this study and in the driving study, they were somewhat less efficient in discriminating the different cannabis doses than in Experiment 1 in which no alcohol was given. Clyde Mood Scale self-ratings indicated a decrease in "clearthinking" and "unhappy" for all drug conditions. The alcohol-cannabis combination did not result in scores on these factors that were different from those of either the low alcohol or low cannabis conditions. The higher cannabis dose resulted in an increase in the factor "friendly", while the other drug conditions were not different from placebo in this respect. Also the higher alcohol dose resulted in an increase in the factor "dizzy" while the other conditions did not. No significant drug differences were found in the factors "aggressive" and "sleepy". The Royal Highness Inventory (RHI) scores increased with cannabis and alcohol as described in Experiment 2. There was no evidence of an additive effect on the RHI in the combined alcohol-cannabis condition. Four and one-half hours after the higher cannabis dose was administered, RHI scores were still significantly elevated, while drug differences on other subjective self-report measures had largely disappeared.

Measures of eyes-closed visual imagery, depth perception, visual acuity and time estimation were also collected. Within 1½ hours after cannabis administration, visual imagery was increased as in the other experiments. The alcohol conditions resulted in a slight decrease in imagery, as was the case in the driving study. The combined alcohol-cannabis dose resulted in a degree of imagery that was intermediate to the low alcohol and low cannabis doses.

There was a suggestion that accuracy of depth perception decreased slightly due to the higher cannabis dose, but not with the other drug conditions. Visual acuity measures were not affected by the drugs. Time estimations of the intervals spent tracking were longer for the cannabis conditions compared to the placebo condition, as was the case in Experiment 1. However, the time spent tracking was under-estimated in the placebo condition, and in this study the time estimates in the cannabis conditions were more accurate. Three to 4½ hours after drug administration, there was a negligible drug effect on these measures.

Physiological measures included pulse rate, conjunctival injection, blood pressure, and palmar tonic skin conductance. Pulse rate and conjunctival injection increased with cannabis, as in Experiment 1. Increases in pulse rate and conjunctival injection also resulted from alcohol, and the combined alcohol-cannabis condition resulted in a greater increase in these measures than was observed with each dose separately. Within 15 minutes after smoking the higher cannabis dose, diastolic blood pressure (while sitting) was an average of 14% higher than in the placebo condition. The difference did not appear when measurements were made 45 minutes after drug administration. There were no reliable changes in this measure under the other drug conditions. No significant drug differences were found in systolic blood pressure, although there was a tendency for an increase in the higher cannabis condition. No consistent effects on tonic skin conductance were found in any of the drug conditions.

Blood alcohol level was measured (with a Breathalyzer) at three times over the course of each session. Estimates obtained after the administration of the low alcohol dose alone were not different from the corresponding measures in the low alcohol-cannabis combination condition. This suggests that at the low doses studied, cannabis does not have a significant effect on the rate of alcohol appearance in and disappearance from the blood.

Discussion

These results indicate that alcohol, cannabis, and the combination of these drugs can result in decreased psychomotor tracking performance. The clearer and more pronounced performance decrement in complex tracking that resulted from the combination of alcohol and cannabis (compared to the same low doses of each drug separately) suggests that the effects of the drugs combine on this measure. Effects of the two drugs also appear to be additive on some of the supplementary variables (for example, pulse rate and conjunctival injection), but to not interact on others (for example, the RHI and the Clyde Mood Scale), and were possibly antagonistic on visual imagery. None of the drug conditions caused subjects to miss signals or respond at the wrong time in the choice reaction test, suggesting no drug effects on the level of attention required to perform this simple task. The high alcohol dose did result in an increase in choice reaction time, in reaction time to tracking control polarity reversals, and in "effective reaction delay time" during continuous tracking. No similar consistent changes in reaction time measures were found with the doses of cannabis employed.

The mechanism for the interaction of alcohol and cannabis effects is not

clear. It would appear that cannabis can enhance certain alcohol effects in the absence of discernible alteration of alcohol absorption, metabolism or excretion. We were not, of course, able to assess the possible effects of alcohol on blood levels of THC and its metabolites. The differential pattern of effects of the alcohol, cannabis, and combination conditions suggests that these drugs do not interact solely by one simply enhancing the general effects of the other. Other doses and conditions of administration must be explored to elucidate the mechanism manifested here.

EXPERIMENT 4: EFFECTS OF MARIJUANA ON VISUAL SIGNAL DETECTION AND GLARE RECOVERY⁶⁰³

Numerous studies indicate that a change in directed attention is a frequent consequence of acute marijuana use. It has been suggested that an alteration in this basic function may underly many of the other major cannabis effects noted in the psychopharmacological literature. However, few studies have focussed directly on cannabis influences on attention and vigilance. In the present study, these functions were assessed using a visual signal detection task.²³⁶

Secondarily, the experiment also explored cannabis effects on the recovery of dim-light visual acuity after bright glare. There is little evidence that a significant effect occurs with marijuana, but because of the potential importance of this question to night automobile driving, further investigation was deemed worthwhile.

Procedure

Five male subjects were trained for six practice runs (over three days) and tested in two placebo (extracted marijuana) and two marijuana sessions each. Two identical sessions, under each of the two conditions, were necessary to obtain sufficient data for the signal detection analysis. The four experimental sessions were given in a balanced alternating order (single blind) with one week between drug treatments. A single dose of marijuana was used (66 mcg Δ^9 THC/kg, averaging 4.7 mg Δ^9 THC per subject). Cigarettes (.4 gm) were administered with the same standard smoking technique used in the other studies. Immediately after smoking, subjects were given a test battery in which the major focus was on the assessment of sustained attention and vigilance (signal detection).

The signal was a brief offset (gap) in a point of light that was otherwise continuously on. The tests were run in a dimly lit room. Five blocks of 100 trials each, separated by 30–60 seconds, were given over a 40-minute period. Subjects were asked to indicate on each trial the presence or absence of a temporal gap in the light, and to rate their confidence in their decision. A warning tone was presented before each trial. A "signal" occurred in only 50% of the trials, in a random sequence.

After the signal detection task (approximately three-quarters of an hour after drug administration) dim-light visual acuity was measured. A forced-choice procedure was employed using *Landolt C* test figures. Subjects were then exposed to a large bright-glare light (440ft-L) for five seconds, and the

time required to recover to the previous visual acuity level was recorded. This procedure was then immediately repeated. Other supplementary measures included pulse rate and palmar skin conductance, the Royal Highness Inventory, a subjective "highness" rating, and eyes-closed visual imagery.

Results

Signal detection. The subjects were generally less accurate in identifying the signal after marijuana and there was a reliable decrement in d' (a measure of sensitivity to the signal) in all subjects for the drug condition. Furthermore, subjects were less confident in identifying a true signal after the drug. Subjects did not fail to respond in any more trials when under the influence of marijuana than in the placebo condition, and there were no systematic changes in the response criteria employed. There were no drug-related shifts in performance over blocks of trials within sessions. The significant decrease in d' was interpreted as an attentional decrement. The performance decrements correlated significantly with the individuals' subjective ratings of the magnitude of the drug-induced "high".

Visual acuity and glare recovery. There was a suggestion of reduced dim-light acuity under the drug condition in some individuals, but this trend was not consistent over sessions or subjects. No significant marijuana effect on glare recovery time was found. The possible confounding effect of a decrease in attention during this task cannot be separated out from the primary variables of interest.

Other measures. As in the previously described experiments, marijuana significantly increased scores on visual imagery, Royal Highness Inventory, pulse rate and the subjective "highness" rating. Again, no consistent effects were seen on tonic skin conductance.

Discussion

The consistent decrement in performance on the visual signal detection task can be interpreted as strong evidence for a marijuana-related decrease in directed attention when a boring and tedious task is involved. It is interesting that this effect correlated well, across subjects, with the subjective sense of drug "highness". No drug-related shift in performance occurred over time within the 40-minute session. Other testing conditions (such as lower signal probability and no warning signal) might give different results. The effects of cannabis on attention and vigilance should be further explored in a broader stimulus and reward context, with varying drug doses, and a greater number of subjects.

No consistent and significant changes were found in glare recovery time and dim-light acuity in this experiment. It is unlikely that a major effect (under the dose and time conditions studied) with practical relevance (to night automobile driving, for example) would have escaped detection, although more subtle effects may have been missed in this secondary aspect of the study.

ANNEX B

THE ADDICTION RESEARCH FOUNDATION EXPERIMENTAL
STUDIES OF THE CHRONIC EFFECTS OF MARIJUANA: A
DISCUSSION OF THE PRELIMINARY SUMMARY

C. G. Miles and associates⁴³⁶ (G. Congreve, P. Devanyi, R. Gibbons, J. Marshman and J. Rankin) at the Addiction Research Foundation of Ontario are two-thirds of the way through a one and one-half year experimental program investigating some possible chronic effects of daily marijuana smoking in the laboratory. This series of studies was designed primarily to explore effects on behaviour—both social and personal. Secondly, parallel investigations of other psychological, physiological and pharmacological aspects of cannabis use were organized around this central aim. A pilot study (lasting 70 days) and two phases of the main study (each taking 98 days) have been completed and a third phase is now in progress. Subjects were required to live in an experimental hospital ward for the duration of each study. All experiments contained a pre-cannabis period, followed by the administration of marijuana or placebo cigarettes, and then a second cannabis-free period.

The analysis and interpretation of the data from these experiments are incomplete and the researchers do not expect to publish a final assessment for at least another year. They have, however, shared some of their preliminary observations with the Commission, but stress that any statements made at this point must be accepted with caution and should in no way be construed as the final interpretation of the data. They state: "Our conclusions are little more than impressions which should be treated conservatively until the appropriate statistical analysis and logical evaluation have been completed."

These experiments provide significant information on the effects of repeated cannabis administration in "normal" users which is not available from earlier studies. Details of the program's progress have not been previously published. Consequently, in spite of the tentative nature of the discussion, an extended preliminary summary of the program was considered appropriate for presentation in this report. Commission staff have been in close contact with the Foundation researchers throughout most of this project, and the design of the Commission's own experimental program was influenced by the anticipation of certain information regarding chronic and sub-chronic effects of cannabis from the Foundation's studies. The two programs provide complimentary information on the effects of cannabis.

PROCEDURE

Each of the various Foundation program sub-studies will not be described in particular detail. Instead, some general features of the research will be discussed and some aspects of the various phases of the program will be outlined. The project was organized around a model "micro-economy" system which approximated some aspects of normal socio-economic behaviour. Subjects were given the opportunity to engage in productive behaviour in the ward for which they were paid in the form of cash value tokens which could

be exchanged for everyday needs or desires. Certain minimal life-maintaining conditions were provided without charge; the bed and cleaning services, heat and light were free. All other items were paid for by the subjects with the cash-equivalent tokens. These tokens could be exchanged, for example, for food, candy, cigarettes, beverage alcohol, newspapers, records, baths, medical information about themselves, access to a gymnasium, to films and other recreational facilities, trips outside in the company of staff members and, in some conditions, marijuana cigarettes.

The costs of goods and services purchased in the ward were generally matched to realistic prices and, in turn, the subjects' earning potential was comparable to that which might occur with similar work in the outside world. In the pilot experiment, tokens were earned for constructing pre-cut wooden furniture and, in the main study, by weaving woollen belts. The work area was open at all hours. Subjects were paid on a piecework basis for completed items which met strict quality standards. A subject might typically earn several hundred dollars per week. Unspent tokens could be saved and exchanged at the end of the experiment for the cash equivalent. Some subjects accumulated several thousand dollars during the period of the study. Complete records were kept of the work output and the savings and expenditures of each subject.

Subjects were healthy young adult volunteers who were regular cannabis smokers and had typically been using cannabis for about two years. (Details as to the frequency of use and quantities usually consumed by these subjects are not yet available.) Persons who showed significant psychological or physiological disorder were not selected. In the pilot study and the first two phases of the main study, males were used as subjects, but in the current third phase, females are being investigated. In the main experiment subjects were assigned, in pairs, to "semi-private" rooms in the ward.

All marijuana or placebo cigarettes used in this program consisted of 1 gm of plant material, although the THC content varied among different conditions. (In terms of total weight, these cigarettes were more than twice as large as 'joints' typically used on the street in Canada, but are comparable in size to regular tobacco cigarettes.) The marijuana used in the main studies originally contained 1.5% Δ^9 THC and approximately 0.2% CBD and CBN combined. Extracted marijuana, essentially containing no cannabinoids, was used in placebo conditions. The studies were run *single-blind* and subjects were given no information regarding the various drug doses or placebo administered, except that it was marijuana. When marijuana cigarettes were made available to the subjects, they were sold for the equivalent of fifty cents apiece, regardless of the THC content involved. Alcohol and tobacco could be purchased and consumed at any time during these studies.

Subjects in the mandatory dose conditions in all of these experiments smoked the minimum required marijuana or placebo dose over a *one hour period* each *evening*, but were allowed to smoke any extra marijuana which they had purchased whenever they wished. The actual smoking technique was not closely controlled, but subjects typically used a deep inhalation style and were asked to smoke essentially all of each required cigarette. In these respects the Foundation program is significantly different from the Commission

studies of acute effects. In Commission research, subjects were required to smoke rapidly following a tightly controlled program of inhalation and breath retention, which maximized delivery and absorption of the active compounds, and also resulted in a much more rapid rate of drug administration. Acute effects are likely to be maximized under these latter conditions. The more flexible and leisurely smoking procedure employed in the Foundation studies is clearly more natural, but allows considerable variability in smoking styles among individuals and allows the subject to control or "titrate" his dose, to some degree, by smoking less vigorously and efficiently after having reached a preferred level of effect. Since such details of administration are likely significant factors in determining effects, the doses used in the two programs cannot be directly compared on a quantitative basis.

Throughout the experiments (including the pre- and post-marijuana conditions) general medical physical and psychiatric examinations were administered at regular intervals. Particular attention was given to electroencephalograms (EEG); heart, liver and kidney function tests; and haematology, blood sugar and other blood chemistry measures. Subjects' behaviour was logged by research staff every half hour. Psychological assessments made at various stages in the experiments included general intelligence tests, psychiatric personality inventories and a self-rating general mood scale. No specific attempt was made to quantify any other subjective or phenomenological effects of the marijuana-induced 'high' in this program. Typically, only heart pulse rate measurements were taken in the evenings after the mandatory smoking period. All other specific tests and examinations were conducted during the day. In most instances, tests were made when the subject was no longer experiencing the major acute effects of the drug, although with the larger doses, some individuals were 'high' essentially all of the time.

Subjects were comprehensively debriefed at the end of the experiments and given psychiatric and physical examinations before discharge. They were instructed that they would be aided in resettlement if necessary, and were asked to report any social, physical or psychological problems they experienced as a result of the experiment. In any case, they were instructed to return after six months for a follow-up investigation.

Pilot Experiment

Six subjects were selected and trained in making pre-cut wood and grass-weave stools. After two weeks without access to cannabis, subjects were allowed to buy as many marijuana cigarettes (each containing 8 mg of THC) as they wished. This one-week "free-purchase" period was followed by four weeks during which the subjects were required to smoke two such cigarettes (containing a total of 16 mg of THC) each evening and, in addition, were able to buy more of these 'joints' if they wished. After this mandatory smoking period, subjects were given a second free-purchase period of one week, and during the final two weeks, no cannabis was available.

Main Experiment—Phase 1

Twenty subjects were employed in the first phase of the main study—10 each in experimental and placebo groups. The two groups were separately housed in identical wards. The experimental group was required to smoke marijuana cigarettes, while the control group was initially scheduled to smoke inactive placebo cigarettes only. The final experimental treatment regime was as follows: (a) *Experimental group*. For the first eighteen days no cannabis was allowed. For the next week marijuana cigarettes (containing 8 mg of THC) were available for purchase. For the following fifty-one days a mandatory minimum dose was given, plus whatever marijuana subjects wished to purchase. During this period the mandatory dose of THC was increased in stages from 16 mg (two cigarettes) per day for 27 days, to 24 mg (three cigarettes) for fifteen days, and then finally to 30 mg (two cigarettes) for nine days. Then followed a twelve-day period when cannabis was again available only on purchase—no minimum dose was required. In the remaining ten days of the experiment, cannabis use was not allowed. (b) *Control group*. After an initial base-line period, inactive placebo cigarettes were administered to the control group. After forty-three days of placebo, a small daily dose of 4 mg of THC was given (for six days) increasing abruptly to a high dose of 30 mg on each of two days. A twelve-day free-purchase period ensued, during which marijuana cigarettes containing 15 mg of THC were available. A final cannabis-free period followed.

Main Experiment—Phase 2

The second phase of the main study was conducted under conditions generally similar to those described in phase 1, but, in addition, was designed to explore the effects of cannabis when it is freely available for purchase and consumed in quantities determined only by the individual's own desires. After an initial base-line cannabis-free period, the ten subjects in the first group were given a mandatory dose of 16 mg of THC (two cigarettes) each evening during the drug period (52 days) and were allowed to purchase more if desired. This was followed by a free-purchase only (non-mandatory) period of 21 days and, finally, one week when no cannabis was consumed. The ten subjects in a second simultaneously-run group were allowed to buy and consume whatever quantity of marijuana cigarettes they desired (each purchased cigarette contained 2 mg of THC, resulting in 'joints', in some respects, more like those available outside). For 52 days, no mandatory lower limits of consumption were required for the second group and they were allowed to smoke at any time. For the next 3 weeks, these subjects were required to smoke a dose of 16 mg of THC (two cigarettes) each evening. A one-week no-cannabis period followed.

SUMMARY OF PRELIMINARY FINDINGS AND PROGRESS TO DATE

The following tentative observations are based on information obtained from the experimental program as a whole. The individual sub-projects are not distinguished in this general discussion.

No evidence of gross physiological damage or medical complications from

marijuana smoking was detected in these studies. Analysis based on visual examination of EEG records did not yield evidence of any significant change in brain wave patterns, but more comprehensive analyses are still in progress. Electrocardiogram (ECG) records showed some transitory changes in heart function, but chronic effects were not considered likely. Many aspects of the physiological data are still undergoing analysis. There were strong indications that the acute rise in pulse rate, which is a characteristic short-term effect of cannabis use, tends to be progressively less pronounced over several weeks of testing, even when doses are increased over time. Alcohol-like 'hangover' effects were not seen with marijuana. Blood and urine samples were obtained in some situations and attempts to detect cannabinoids and their metabolites in these body fluids are in progress.

No gross behavioural changes appeared during the experiments. The drug did not seem to induce hostility or aggression, and no evidence was found of social deterioration, or a decline in concern over personal hygiene or general physical condition. No major changes in general sleep patterns were observed. Chronic mood modification was not reflected in either staff ratings or the subjects' self-reports. No significant alterations in intellectual functioning were detected by the methods employed in these studies. Psychiatric examinations found no adverse effects as a result of cannabis use in the experiments.

In general, subjects reported that mandatory consumption of large doses of marijuana for long periods of time was subjectively unpleasant. In the highest dose condition, most subjects requested to stop marijuana use. Some even insisted that they would leave the experiment if forced to continue smoking high doses. (This would have resulted in a loss of 75% of their earnings and, for many subjects, this would have been a substantial sum of money.) The mandatory high dose was subsequently stopped. Almost none of these subjects expressed a desire for cannabis after this experience.

When a free-purchase situation was allowed, with cigarettes approximating the THC quantity of those available on the 'black market', the average daily consumption was less than one cigarette (containing 2 mg of THC). On days in which subjects did smoke they typically consumed between 2 and 4 mg of THC to get 'high'.

The data regarding the relationship between the use of marijuana, alcohol and tobacco under the experimental conditions have not yet been completely analysed and no statement of results in this area has been made.

When large mandatory doses of marijuana were introduced after long periods of abstinence in the laboratory, work productivity tended to be depressed. Discontinuation of marijuana use after a prolonged period of forced daily smoking of high doses resulted in an increase in productivity. When the work output of subjects on a mandatory high dose was compared to that of subjects who consumed only the amounts they desired (which were, in fact, relatively small quantities) the forced-dose group showed dramatically lower average productivity, which was most pronounced in the first few weeks. Some behavioural adaptation or tolerance to this effect of the drug seemed to develop over the course of the experiment and differences between the mandatory and free-purchase groups were minimal towards the end of

the experimental period. The researchers suspect that this productivity decrement is due more to a reduction in time spent working, rather than to inefficient performance.

The investigators have been unable to detect any clear evidence of dependence on cannabis, or the presence of a withdrawal syndrome when the use of the drug is stopped.

Follow-up investigations, to date, have found no persistent effects of the experimental procedures except for a tendency for subjects in the high dose condition to report a decrease in cannabis consumption compared to a similar period before the study.

DISCUSSION

It should be restated that these studies provide tentative information on the effects of daily administration of various doses of marijuana for periods of weeks or months. To this extent, chronic effects have been investigated, but the program was not intended to provide a simple basis for predicting possible consequences of many years of regular cannabis use. There may be some long-term effects which are not detectable until after a more prolonged period of heavy use than was studied here. In addition, it must be stressed that non-behavioural measures were given only secondary attention in this program, and in some areas the evaluation battery employed was rather limited. Subject to these limitations, the major impression of the program's progress, to date, is of the paucity of chronic changes in physiological, behavioural and psychological functioning detected in these studies, even at daily doses well beyond the subject's normal and preferred levels of use.

The problem of bringing natural behaviour into the laboratory for controlled study, without significant disruption or artificial alteration of the phenomenon of interest, is a perpetual issue in science. Interpretation of the behavioural aspects of the Foundation's program are, of course, subject to considerable limitations appropriate to the conditions of the experiment. It is clear that living under almost continuous observation in an experimental hospital ward is far from normal conditions of life and marijuana use. Behaviour under such a situation can be expected to be modified accordingly. Subject's conduct, for example, might be more controlled and socially acceptable than would occur in private. Also, the effects of the boredom or stress of institutional living would likely have significant influences on many aspects of the data. The overall importance of the unique setting provided in these experiments cannot be easily determined, and many observations made here will clearly have to be re-examined under different conditions.

Although the data on socio-economic behaviour cannot be interpreted in a simple, straightforward fashion, the program does provide evidence of at least temporarily reduced work output in the laboratory when the consumption of high doses of marijuana is required. The relationship between this effect and the so-called "amotivational syndrome" sometimes noted in clinical reports of chronic heavy users is not clear, but the data do lend support to the notion that cannabis, in certain circumstances, may reduce motivation for performing certain normally conducted tasks. Some characteristics of data of

this type are very likely determined to a significant degree by the nature of the tasks involved. In this program, labour was of a repetitive, handicraft nature. Effects on work of a more intellectual or artistic variety, or on tasks of the subjects' own choosing, might yield different results, and should be explored.

These studies suggest that certain kinds of tolerance to some marijuana effects may develop. Evidence of reduced acute pulse-rate response to repeated marijuana doses (or to a single dose in heavy users) has been noted in several laboratories, and the data presented here provide additional support to these observations. The work output analysis suggests some adaptation or tolerance to the initial behaviour-disrupting or modifying effects of high dose use, as well. However, the question of tolerance to the rewarding or reinforcing aspects of the drug, which might lead to increased self-administration, cannot be clearly answered from the data provided here. No attempt was made to quantify the magnitude or quality of the acute subjective response or 'high' obtained from the drug over repeated use. The data on free-purchase consumption, which is potentially most directly relevant, does not provide a complete picture. Under the mandatory smoking conditions studied, little additional marijuana was purchased and consumed by the subjects at any time, and in the completely optional, free-purchase periods, no suggestion of increased marijuana use over time occurred. In fact, subjects typically consumed less cannabis per day during free-purchase periods towards the end of the experiment than they did at the beginning. Tolerance to the reinforcing effects of the drug, and a subsequent increase in quantity or frequency of use, might occur with some individuals in other situations, but it does not appear to be a predominant characteristic of marijuana under conditions so far studied in the laboratory, or with present typical use in North America.

The lack of evidence for a withdrawal syndrome or other significant signs of dependence, even after apparently very high daily doses, is in agreement with the bulk of the scientific literature. But there is still a gap in our knowledge of the possibility of symptoms of dependence in individuals who might consume (either in the laboratory or 'on the street') even larger quantities of marijuana, throughout the day, for longer periods of time. There is little indication, however, that physical dependence on cannabis is a likely phenomenon under any natural conditions.

It is also interesting to note that the intermittent patterns of marijuana use and the quantities consumed during the optional free-purchase periods in the laboratory were quite similar to that commonly observed in users under natural conditions in Canada. Daily use of high doses was generally considered undesirable from the subject's point of view. Many aspects of these data are undoubtedly influenced significantly by the individual's previous history and normal patterns of cannabis use. Consequently, the final analysis and interpretation, in some areas, will require a detailed consideration of the subjects' past levels of use.

Some objection might be made regarding the possible confounding effects of generally open access to alcohol and tobacco throughout the study. This option does potentially permit, however, some evaluation of the interrelationships among the use patterns of the various drugs in the experimental setting.

Although these data are not yet fully analysed, it appears that alcohol consumption during the experiment was probably not great enough to have contributed significantly to the few effects observed, nor does it seem very likely that the intermittent drinking which occurred has masked other potentially detectable cannabis effects. However, these possibilities cannot yet be completely ruled out. Ongoing data analysis will clarify some of these issues.

A different pattern of response might have emerged on some parameters if subjects were required to smoke in the morning, for example, or at various times during the day, rather than just at night. However, even with such variations in procedure, major differences in the picture of chronic effects observed here would seem unlikely for most variables. It would also be of interest to study subjects of different age groups, with differing past histories of drug use.

The program provides an interesting and valuable exploration of the application of a micro-economy model in the study of drugs. The investigators feel that the methodology employed in these studies is an experimentally useful technique and may have broad therapeutic possibilities as well. The Foundations' final report on the program (to be available in 1973) should contain a substantial amount of significant information on the effects of the repeated use of cannabis.

ANNEX C

SOME DIRECTIONS FOR FUTURE RESEARCH ON THE
PHARMACOLOGICAL AND CHEMICAL ASPECTS OF THE NON-
MEDICAL USE OF CANNABIS

In the past few years we have witnessed a significant advance in our knowledge of cannabis and its effects: systematic botanical studies have begun; the primary chemical constituents of cannabis have been identified and isolated, and many synthesized; some of the basic factors of cannabinoid absorption, distribution, metabolism and excretion have been elucidated; many prominent short-term physiological, behavioural and psychological effects have been documented; many basic animal toxicology studies have been completed, and previous restrictions on human experimental research are being relaxed accordingly; recent advances in cannabis chemistry and pharmacology have stimulated a re-interest in the possible use of natural and synthetic cannabinoids in the medical treatment of a variety of disorders; and a number of systematic studies of possible social, psychological and physiological effects of long-term use are underway and the preliminary findings of several investigations into chronic and sub-chronic use are available. In spite of this impressive advance, many important questions are as yet unanswered and must be resolved before a full picture of the etiology, general characteristics and consequences of the non-medical use of cannabis can be presented.

The following discussion provides some indication of areas of cannabis chemistry and pharmacology where further research is needed. Specific attention has not been given here to research into other aspects of the non-medical use of cannabis (such as the social history and context, extent and patterns of use, causes and motivation, education and prevention, and legal and economic implications) except as they pertain to the topics discussed in Chapter 2, *Cannabis and Its Effects*. Some suggestions are addressed directly to issues of immediate social concern which urgently need clarification. Others are focussed more on the acquisition of basic scientific information, perhaps of direct and immediate interest primarily to researchers, but which is likely, in the long run, to contribute significantly to our general scientific knowledge of cannabis and, ultimately, to the better understanding of those aspects of its non-medical use which are of potential concern to society. Further discussion of general topics pertaining to scientific investigation, in the broader framework of non-medical drug use, will be presented in a later report, in a section primarily concerned with the role of government in this area.

Although a number of important questions regarding the acute effects of cannabis are unanswered, the possible personal and social consequences of long-term use are of primary concern. Multi-disciplinary longitudinal studies of various sectors of the general population, including groups of users and non-users, would be invaluable and should be initiated. However, at least tentative answers to certain questions are urgently needed and cannot await the completion of such long-term investigation. The possible consequences of chronic use on cognitive and intellectual ability, psychomotor skills, personality, social behaviour and general physical condition (for example, brain,

respiratory, heart, liver, kidney and endocrine function) are subjects of much immediate concern. Of special importance are possible effects of regular use on the maturation process in adolescents.

Large-scale cross-sectional studies of persons with varying histories of cannabis use are likely to provide a reasonable short-term payoff. Since the common use of cannabis is a relatively recent phenomenon in North America, it will be difficult to locate an adequate number of suitable subjects for extensive epidemiological study, although certain more restricted projects could be conducted on this continent. It will be necessary to turn to other countries, which have had a longer history of widespread cannabis use, for large-scale epidemiological investigation. Several studies of chronic users in other cultures are currently underway, but considerable additional effort is warranted. Cross-cultural generalizations must be made with caution, and many conditions of non-industrial countries may have limited applicability to the North American situation.

Research into chronic effects must take into consideration the possible influence of such variables as age, sex, education, socio-economic status, nutritional and hygienic conditions, multiple-drug use and a variety of other ethnic and cultural factors. Appropriate control groups must be compared with experimental subjects for whom reasonable information is available on the frequency and duration of cannabis use and the quantities consumed. Accurate correlational data of this nature cannot establish causal factors, but may suggest links and provide clues for further research. If an association were found between cannabis use and other variables, in many instances it would be difficult, if not impossible, to distinguish drug effects from predisposing personal and environmental factors.

Several sub-chronic studies are in progress which involve the daily administration of cannabis to humans under controlled laboratory conditions, over periods of weeks and months. Such experiments can provide certain information regarding the consequences of chronic use, but cannot detect possible effects which might develop only after more prolonged periods of exposure.

In some areas basic information can be obtained from studies of chronic cannabis administration to animals. However, the significance of such studies must ultimately be interpreted in the context of human conditions of drug use. Further effort should be made to develop animal tests which will parallel pharmacological processes and effects in humans. Because of often substantial inter-species differences, findings involving lower species should be verified in primates. Since animal studies have traditionally employed massive doses (administered under conditions of questionable relevance to human situations) it is important to explore the acute and chronic effects of cannabis on animals at doses which are more comparable to the quantities likely to be consumed by humans.

Over the past few years, almost all experimental research has been conducted on healthy, young adult males. Earlier cannabis experiments often employed male prisoners as subjects. Other populations need to be investigated, especially females, and adolescents and older persons of both sexes.

Cannabis effects in persons with varying histories of other chronic drug use

should be investigated. Alcohol is perhaps most important in this regard. Experimental reports should specify, in detail, the subjects' past and current patterns of medical and non-medical drug use. Unless characteristics of the initial reaction to cannabis, or the adaptation to its effects early in the career of use, are of central concern to the study, the use of cannabis-naïve subjects may not be advantageous. In most areas, information on regular users, who have developed a more consistent and stabilized general response, would be of considerably greater immediate social significance.

Although this discussion is not directly concerned with general social aspects of the extent and patterns of cannabis use in society, a clear understanding of the present, and likely future, conditions of use is essential for optimal laboratory efforts. Information on multiple-drug use provides useful leads for drug interaction studies. Socially relevant experimental conditions, including appropriate drug doses, require accurate information from socio-pharmacological field studies. Factors associated with the initiation, increase, stabilization, reduction or cessation of cannabis use may provide valuable leads as to effects. In addition, the influence of social attitudes regarding cannabis use on the ultimate social, psychological and physiological effects of the drug needs further study.

It is also necessary to maintain accurate information as to the identity, purity and potency of drugs being consumed from illicit sources. Existing limited data suggest that, in Canada, cannabis is rarely adulterated with other active drugs, but that it is sometimes diluted or 'cut' with inactive materials, and that illicit cannabis varies in cannabinoid content over a wide range. However, no really adequate, systematic, national data have been collected. Serious questions have been raised regarding possible contamination with herbicides, pesticides and toxic fungi. Appropriate analyses have not been done in these areas. Up-to-date, continuing qualitative and quantitative analyses of randomly selected sub-samples of police seizures (supplemented with samples from other sources) might be the best method of monitoring the purity and potency of illicit cannabis in Canada. Information on the age and original geographic source of the samples would add to the value of the program. The comparison of such data with similar information from sources in other countries would be of further interest.

Considerable controversy exists regarding the appropriate chemical nomenclature for cannabinoids. A final decision should be made on an international basis to establish an acceptable uniform cannabis nomenclature system.^[5]

Reliable standard analytic techniques for quantifying the major cannabinoids in various cannabis preparations should be developed and communicated on an international basis, and the effectiveness of such a program should be evaluated with follow-up research involving standard test materials. The reliability and validity of present methods of cannabis quantitative analysis are disappointing, and even recent experimental cannabis studies which have attempted to specify THC dose can only be interpreted in a general quantitative sense. Facilities for adequate analysis (and re-analysis) of research materials should be made available to all investigators.

In a closely related area, there is a definite need for simple and convenient

techniques for identifying and quantifying primary cannabinoids and their metabolites in the body. When such methods become available, the relationship between body levels of biologically active compounds and primary effects should be established. A convenient quantitative chemical test, similar to the alcohol Breathalyzer, which might ultimately enable a reasonable estimate of the intensity of certain drug effects would be invaluable, and must be given high priority. Although considerable progress is being made in this area, even those methods which are likely to be refined in the near future may have limited practical application outside of the research laboratory.

While much is known regarding the agriculture of hemp fibre production, until recently, little systematic modern botanical research had been conducted on psychotropic aspects. Several important projects are in progress in Canada and other parts of the world, and further research in this area would be of value.

Variables affecting the stability, degradation and shelf-life of different forms of cannabis are not adequately understood. Effective standard storage procedures should be developed and communicated to researchers.

Almost all of the recent human experimental research has been conducted with marijuana or synthetic Δ^9 THC. While there are obvious advantages to the use of uniform substances in experimental work, because of the unusual heterogeneous nature of the various preparations of *Cannabis sativa* in use around the world, different strains of marijuana and varieties of hashish samples should be available for chemical and experimental evaluation. Supplies of other primary cannabinoids and their metabolites, in relatively pure form, should also be developed and made available to researchers for human and animal studies. The development of water soluble cannabinoids would greatly facilitate experimental studies of effects relevant to both the medical and non-medical use of cannabis.

Quantitative information on major cannabinoids in experimental materials should be provided in research reports. The pyrolysis and delivery of cannabinoids smoked in cigarettes, conventional pipes or water pipes may not be directly comparable and further investigation is warranted. Until convenient methods are available for assessing the levels of active cannabinoids in the body, researchers should provide estimates of the actual cannabinoid dose delivered to the subject in the smoke under the experimental conditions employed. Specifying doses on a body-weight basis would further aid the interpretation of experimental results.

In some respects, it would appear advantageous for researchers to adopt more uniform modes of cannabis administration for experimental study. However, the variety of styles and techniques of cannabis consumption around the world requires that different modes of administration be investigated. Possible differences in the acute and chronic effects of various methods of cannabis smoking and ingestion should be examined. Furthermore, factors which affect the rate and extent of absorption of cannabinoids in the lung and gastro-intestinal tract have not been adequately delineated.

Advances are being made in our knowledge of the metabolism and distribution of THC in the body, but considerable further research is needed. Since

CBD and CBN are present in large quantities in some forms of cannabis, these cannabinoids should be thoroughly investigated, as well. The possibility that primary cannabinoids or their metabolites may accumulate in the body for prolonged periods with chronic use should be carefully explored and any physiological consequences elucidated.

The mechanisms involved in the various central and peripheral effects of cannabis are poorly understood. Studies in this area should be encouraged, and *structure-activity relationships* of the various primary cannabinoids and metabolites should be established.

Although it is now clear that Δ^9 THC is the principal active constituent in cannabis (at least in part via metabolites) the possibility remains, and must be explored, that other cannabinoids (particularly CBN and CBD) may in some way alter the pharmacology of THC and its metabolites. CBD and CBN might alter the function of primary organs of metabolism and excretion, for example, or perhaps play a significant role in cannabis tolerance or sensitization, or interaction with other drugs. Competition for binding or receptor sites might also exist among the cannabinoids. The possible long-term effects of other, non-cannabinoid, components of marijuana and hashish should also be examined.

Cannabis seems to produce few significant short-term physiological effects in normal users. Both acute and chronic effects, however, should be investigated in persons suffering from certain physical disabilities as well. Of particular concern are the effects of cannabis on persons suffering disorders of the respiratory system, gastro-intestinal tract, cardiovascular system, liver, kidney, reproductive organs, endocrine system (including diabetes), and the central and autonomic nervous systems. Since cannabinoids are primarily metabolized in the liver, potential effects on hepatic function should be given special attention.

Available evidence suggests that chronic smoking of large quantities of cannabis may have effects on the respiratory system which are in some respects similar to those produced by tobacco. Differences in typical patterns and methods of smoking, as well as quantities consumed, complicate simple comparisons between the substances, however. The possibility that cannabis (either alone or in combination with tobacco) might complicate or produce respiratory disorders, including cancer, must be thoroughly investigated and possible toxic components identified.

Considerable effort must be concentrated on rectifying conflicting data on possible neuro-toxic effects of chronic cannabis use. Although several recent controlled studies have found no evidence of neurological disorders in persons with long histories of heavy use, other clinical reports have suggested chronic effects (including brain damage) in certain users. The seriousness of the conditions implied in these latter papers requires that immediate systematic investigation be given high priority. Additional human and animal studies on chronic and sub-chronic use are needed.

Reports of the acute and chronic effects of cannabis on sleep are conflicting, and the existence and ultimate neurological and behavioural significance of any changes need to be established.

Present data does not indicate that cannabis produces chromosome abnormalities or has adverse consequences on the developing foetus in humans, but some studies of certain lower species have detected adverse effects at extreme doses. Because of the seriousness of any such possible effects in humans, further research is required.

Existing research reports of the acute effects of cannabis on muscle strength and physical work output are not conclusive, although some deficit is suggested. On the other hand, it has been reported that cannabis is used in certain countries by labourers to reduce fatigue and increase work energy. Several relevant studies are in progress, but the effects of acute and chronic cannabis use on physical labour and athletic performance, under laboratory and natural conditions, have not been defined.

Recent advances in cannabis chemistry and pharmacology have stimulated a re-interest in the possible use of natural and synthetic cannabinoids in the treatment of a variety of disorders. Research of this nature is likely to result in a significant advancement in our basic knowledge of cannabinoids and their effects on the human body, as well as possible medical progress.

There are considerable differences among individuals in the general response to cannabis. The importance of an individual's personality, physical characteristics, past drug experiences, and the set and setting of use, in determining various cannabis effects should be systematically investigated.

Experimental evidence indicates that under some conditions cannabis can produce short-term deficits in certain perceptual, attentional, cognitive and psychomotor abilities. The overall significance of the effects found in the laboratory, to personal, social and occupational functioning under natural conditions has not been fully established. Further research, under more natural conditions, should be undertaken and the predictive validity of laboratory tests empirically evaluated. Data relating cannabis use to scholastic performance are contradictory, and many factors in such correlations require study.

Cannabis users typically claim substantial acute subjective alteration in sensory and perceptual processes as a result of taking the drug. Attempts to verify such effects in the laboratory have met with surprisingly little success. Although it is appropriate to concentrate initially on possible adverse effects of cannabis, it would be worthwhile, in order to better understand the growing popularity of the drug, to experimentally investigate, in more sensitive fashion, some of the subjective effects which users claim provide the reinforcement or motivation for continued use. Additional research, especially in the areas of visual perception (under various conditions of illumination), and attention and vigilance should be conducted, employing signal detection techniques where applicable.

Under certain experimental conditions, cannabis has been shown to have detrimental effects on automobile driving performance. A detailed analysis of such effects, and possible consequences for traffic safety, is needed. After basic parameters have been established, however, experimental studies can provide only a limited basis for predicting the ultimate effects of natural drug use on traffic safety. Once appropriate biochemical tests have been developed for the

detection and quantification of active cannabinoids in the body, epidemiological studies should be initiated to establish the extent to which cannabis and other drugs are associated with traffic accidents in the general population. Comparisons of drug levels in persons who had been involved in accidents, with drug levels in suitable control subjects (who had not been associated with accidents) have been of primary importance in clarifying the traffic hazards of alcohol. Since epidemiological studies of this nature can yield reliable information on a drug's effects on traffic safety only if the incidence of the use of the drug in the driver population is fairly substantial, such a study is most likely to be fruitful in those geographic areas where cannabis use is most prevalent.

Acute anxiety or panic reactions to cannabis (generally of little significance) have been reliably reported. Little systematic information on contributing factors is available, although it appears that such occurrences are infrequent and typically involve higher doses and less experienced users. Apparently only a small proportion of such occurrences are ever seen at treatment facilities. Since acute anxiety or panic reactions occasionally occur in laboratory studies of cannabis, valuable information might be obtained if detailed data regarding such incidents were collected from researchers. A prospective study could be undertaken employing standardized report forms outlining potential contributing factors.

A considerable body of clinical literature from Eastern and other non-industrial countries suggests that the heavy chronic use of cannabis may be associated with a variety of psychological and behavioural disorders. Some investigators claim that a specific "cannabis psychosis" exists, while others deny that such a separate clinical entity can be established. There have also been reports of chronic dementia in certain long-term users. Methodological limitations in the reports preclude a comprehensive evaluation of these claims. Modern systematic studies of these populations have not been conducted and should be initiated.

The view that cannabis may precipitate a significant psychotic reaction in certain predisposed individuals has also been noted in the North American clinical literature, but such claims have yet to be systematically evaluated. Furthermore, there is no consensus as to the nature of possible predisposing factors in such conditions or their prevalence in the general population. Prolonged psychological correlates of chronic use of a more subtle nature (including personality changes and an "amotivational syndrome") have also been given considerable notice in the clinical literature. It is not yet clear what role cannabis might play in the behavioural syndromes described.

While anecdotal reports of individual cases selected from poorly defined patient groups are of very limited value, accurate clinical reports, put in a proper population context, can provide valuable clues for subsequent systematic study. Clinical investigations, involving appropriate control groups, should focus particular attention on pre-morbid social, psychological and physical conditions, previous and concomitant use of other drugs (including detailed information on the quantities involved and the duration and frequency of use), static and dynamic symptom patterns, and long-term follow-up. It would be of interest, for example, to compare past patterns of drug use

in patients presenting similar psychiatric symptoms. Detailed longitudinal study of symptom change in various groups of cannabis-using and non-using patients might also prove fruitful. Studies of predisposing factors involved in more subtle behavioural syndromes would be considerably more perplexing, and it may be extremely difficult to establish cause and effect relationships with present methods of investigation. Of special concern are possible adverse effects of chronic cannabis use in young adolescents.

Given that a variety of adverse psychological reactions may be associated with cannabis use, it is important to investigate and thoroughly document reported cases and to determine the frequency and severity of such reactions in the general population of users. Studies of patient populations alone cannot provide appropriate information for this purpose. There is currently little evidence that serious disorders occur in a significant proportion of the user population, but adequate data are not available. Significant changes in the extent and patterns of cannabis use in Canada would undoubtedly alter the treatment picture, and the effects of such changes should be carefully and systematically monitored.

Recurrences or "flashbacks" of some cannabis effects in the absence of the drug are occasionally reported, but the concept has not been clearly defined, and we have little knowledge regarding the frequency, intensity and consequences of such experiences. More information is needed.

Although gross tolerance to the major effects of cannabis does not develop under conditions of moderate or intermittent use, many aspects of this phenomenon have not been adequately investigated. The often-mentioned "sensitization" or "reverse tolerance", reportedly occurring with the first few experiences with cannabis, has not been examined in the laboratory. Furthermore, there is increasing evidence that with intermittent or moderate use, some tolerance or behavioural adaptation develops to some of the initially disrupting effects of the drug. The mechanism for such a change in response is uncertain. There is growing evidence that chronic heavy users in some countries have developed a significant degree of tolerance to the general effects of cannabis, including those that reinforce use, and may consume much greater quantities than are tolerated or desired by other users. Contributing pharmacological, psychological and social factors in this complex picture remain to be documented.

There is little evidence that cannabis, even with prolonged use at high doses, produces significant signs of "classical" physical dependence, although more subtle, undesirable, physiological and behavioural symptoms may occur on withdrawal in some situations. Possible effects in this regard should be characterized and their influence on sustained patterns of use, under natural conditions, explored. The general concept of behavioural or psychological dependence should be defined in an adequate operational fashion, if possible, and the existence and consequences of the phenomenon in various populations of cannabis users investigated.

The possible interaction between the effects of cannabis and a full spectrum of other drugs commonly in use (both medically and non-medically) should be explored, and likely physiological, psychological and social components and consequences of such interaction examined. Available evidence suggests

that cannabis and alcohol can produce additive detrimental effects on certain psychomotor skills and may enhance certain common physiological reactions. The mechanisms and characteristics of these interactions should be fully investigated, and implications for automobile driving and the operation of complex machinery given special attention. Although cannabis has exceptionally low lethal toxicity, the possibility that it might enhance the toxic effects of an overdose of other drugs, such as alcohol, barbiturates or opiate narcotics, should be thoroughly explored.

Significant controversy exists regarding the relationship between the use of cannabis and the use of a variety of other drugs, including alcohol, heroin, tobacco, amphetamines and LSD. Social, economic and criminal-legal, as well as pharmacological factors predisposing to multiple-drug use, should be further investigated. Careful prospective studies would be helpful, although even with considerable effort it may not be possible to establish causal links among the various factors with any degree of certainty.

A centralized (perhaps international) documentation, information-gathering and alerting system would greatly facilitate effective communication among researchers in this rapidly expanding field. Because of the accelerating nature of scientific information on cannabis, existing modes of publication and communication are hardly adequate.

International co-operation and co-ordination in some of the areas discussed above might be effectively conducted through the World Health Organization, as suggested in their recent cannabis report.⁶⁷⁸

- [a] This chapter covers information available to the Commission up to February 15, 1972. Because of unavoidable delays in the acquisition of certain documents, coverage of the literature published in the last few months is relatively less complete than the review of earlier work. As noted in Chapter 1, the Commission has had access to several thousand papers dealing with cannabis. No attempt has been made to reference all available documents either in the text or in the selected bibliography presented.
- [b] The genus *Cannabis sativa* was initially proposed by the botanist Linnaeus in 1753, although the word *cannabis* derives from far earlier vernacular and scientific usage. The ancient Assyrians, for example, named the plant *Quonoubou Qunnapu*, while the Hebrews called it *Qanneb*, the Arabs *Qannob*, the Persians *Quonnab*, the Celts *Quannab*, and the Greeks *Kannabas*,^{70,546} all of which are synonymous with the English term 'hemp'. (See also the following note.)
- [c] "True" hemp (*Cannabis sativa*) is sometimes confused with a variety of other commercial fibre-producing plants, among these: manilla hemp (abaca fibre), sisal hemp (agave sisalana) New Zealand hemp (phormium), Mauritius hemp, henequen (agave rigida elongata), all of which are leaf fibres. Fibres obtained from the stalks of plants are called bast fibres and include: "true" hemp, jute, flax, ramie, sunn ('hemp'), kenaf, urena and nettle.⁹⁵ Cannabis is also not to be confused with "Canadian Hemp" (*apocynum cannabinum*) or other members of the general families *Cannabaceae* or *Daliscaceae*. Only *Cannabis sativa* contains cannabinoids.
- [d] Other hypotheses regarding the etymology of marijuana include the Mexican *mari-iguana* (referring to the ritual use of an iguana in some traditional cannabis-smoking ceremonies). It is also possible that *marijuana* may have originally referred, in Mexico, to a low grade of wild tobacco (*nicotiana glauca*) or is derived from the Indian word *malihua* meaning prisoner, thus expressing the idea that cannabis takes possession of an individual and makes him a prisoner of it. It is certain, however, that the word *marijuana* has been used in North America to describe a cannabis preparation since the drug was first introduced to the United States and Canada.^{219,371,374,561,600,656,674}
- [e] Other general cannabis reviews, presented within the last two years, that have been of assistance in preparing this chapter include those by Barber,³⁰ Bourassa,⁷² Braude *et al.*,⁸⁰ Brill *et al.*,⁸³ Carr *et al.*,¹¹³ Davidson and Barclay,¹⁵⁰ Gershon,²²⁰ Goode,²³² Grinspoon,^{242,243} Hollister,²⁸⁰ Joyce and Curry,³⁰⁹ Kalant and Kalant,³¹¹ Kaplan,³²¹ Malcolm,³⁹⁰ McGlothlin,^{411,413} Mechoulam,⁴²¹ Medical World News,⁴²⁵ Nahas,⁴⁶² Pillard,⁵⁰⁴ Schofield,⁵⁴⁴ Smith,^{573a} Snyder,⁵⁷⁸ Unwin,⁶³⁶ Whitlock.⁶⁶⁷ Significant recent reviews of more specific cannabis topics include those by: Domino *et al.*,¹⁵⁷ Hardman *et al.*,²⁵² Mechoulam,⁴²⁰ Skinner,⁵⁶⁶ Small,⁵⁶⁷ Truitt⁶¹⁸ and Willinsky.⁶⁷² The following bibliographies of cannabis publications

were used in preparing this report: Gamage and Zerkin,²⁰⁶ O. Kalant,³¹² Moore,⁴⁵² Rickles *et al.*,⁵²¹ United Nations Division of Narcotic Drugs,⁶²⁸ United Nations Economic and Social Council (and current supplements),⁶²⁹ Waller and Denny.⁶⁴⁵ In addition, the Documentation Department of the Addiction Research Foundation has provided the Commission, on contract, with current cannabis-related publications through reviews of bibliographies and computerized journal searches such as CAN-SDI and ASCA.

- [f] *Cannabis sativa* is one of the few plants with psychotropic properties which does not contain major active alkaloids.
- [g] Recently at the University of Mississippi, between 300 and 700 pounds of manicured marijuana were obtained per acre.^{158,159} In India, approximately 300 pounds per acre was reported.⁴¹³ It is not entirely clear why the yield was so much higher in Ottawa (1,800 pounds per acre).
- [h] Some information regarding typical marijuana cigarette sizes was obtained from two Commission projects. Sixteen experimental subjects (all regular cannabis users) of one study²⁵¹ were asked to hand-roll one or two 'joints' "... like the ones you usually have. Placebo marijuana was used and the subjects were aware that the resulting cigarettes would not be consumed. Twenty-two cigarettes were produced, which contained between 270 mg and 638 mg of material, with a mean of 408 mg and a standard deviation of 114 mg. In a separate study,²³⁸ 14 subjects were asked to record the quantities of cannabis consumed each time they and their friends used the drug. The 59 cigarettes reported ranged from 83 mg to 750 mg of marijuana, with a mean of 329 mg and a standard deviation of 146 mg. The figures from these two independent sources (but both groups of subjects were primarily from the Ottawa area) generally corroborate other less formal estimates^{237,438} that 'typical joints' in Canada contain about one-third of a gram of marijuana.
- [i] One hundred twelve seizures each of marijuana and hashish were selected by examination of R.C.M. Police exhibit reports and were sent from the vaults of the Bureau of Dangerous Drugs to the Pharmaceutical Chemistry Section of the Department of National Health and Welfare. Analyses were carried out by H. D. Beckstead. All of the selected seizures which were of an acceptable condition and of an adequate quantity were analysed, resulting in a total of 79 marijuana samples (including four seizures of plants) and 62 hashish samples. The results of the qualitative analyses of these samples are shown in Table 1(1.B), along with nine marijuana and nine hashish samples seized since October 1971 (selected by the analysts of the Pharmaceutical Chemistry Section from among those in their possession).

For purposes of quantitative estimates, seizures which met the following criteria were employed: (1) Less than eighteen months between date of seizure and date of analysis; (2) weight of hashish samples between 0.1 gm and 3 gm, and marijuana samples between 1 gm and 14 gm, or any number of marijuana cigarettes. These quantities were selected as being representative of the amounts or forms in which cannabis is

ultimately delivered to and consumed by the user. The resulting collection was composed of 45 marijuana and 37 hashish items. On analysis, one 'marijuana' sample and three 'hashish' samples were found to contain no cannabinoids, leaving 44 marijuana and 34 hashish samples reported in Table 2(B.1). The nine recent seizures described above are also shown in Table 2(B.2). In addition, samples from the four seizures of plants are shown in Table 2(A.2.B).

These seizures were not altogether representative of national seizure totals for 1970-1971 in that Ontario was somewhat under-represented and the Prairie and Maritime Provinces were relatively over-represented.

- [j] These samples were analysed for the Commission by H. D. Beckstead, of the Pharmaceutical Chemistry Division, Department of National Health and Welfare.
- [k] These samples were analysed for the Commission by J. Marshman and R. Berg of the Addiction Research Foundation of Ontario.
- [l] If we are right in assuming that the effects of THC provide the primary reinforcement for cannabis use and, further, that users adjust the quantities consumed of various cannabis preparations (of differing THC content) accordingly, then because of the higher CBD and CBN to THC ratio in hashish, a person using hashish would typically absorb several times the total cannabinoids to obtain the same THC dose as he would if he were using marijuana.
- [m] Information provided to the Commission by representatives of the Canadian pharmaceutical companies involved indicates that Wampole Ltd. last produced cannabinoid-containing Hypno-Bromic Compound® in December 1954, and Parke Davis and Co. deleted cannabis from its Chlor-Anodyne® in 1947. The Commission has been informed that old stocks of such cannabis preparations exist at present in some pharmacies in Canada.
- [n] Doses discussed in this report refer to THC quantities in cannabis material before it is smoked. As noted in the text, under most conditions less than half of this original dose is actually delivered in the smoke to, and absorbed by, the subject. Until smoking techniques are standardized and/or convenient methods are available for actually assessing cannabinoid levels in the body, it seems most reasonable to present dose information in the original form with the appropriate qualifications.
- [o] The development of an efficient anti-THC antibody for analytic purposes could conceivably provide the basis for the development of a vaccine which would immunize individuals against cannabis effects.^{94,203,673}
- [p] High Purity synthetic Δ^9 THC was dissolved in hexane. Extracted alfalfa was added to this solution and the solvent evaporated off. The quantities mixed were intended to produce a preparation which contained 5% THC by weight. Although on analysis a considerable range of figures was obtained from different authorized laboratories, the more reliable measurements indicated that we were successful in achieving

this goal. Similar problems existed in obtaining adequate quantitative estimates of the THC content of the marijuana. The more reliable extraction and analytic techniques suggested that this material contained approximately 3% THC by weight. The cannabinoid values provided by NIMH with the original shipment indicated that the marijuana contained 2.9% THC and 1.1% CBD. The latter value was later found to be a clerical error and the original CBD value was probably closer to 0.1%. Both the marijuana and THC supplies were obtained from the U.S. NIMH (marijuana sample 2-PF-109; THC sample SS-C-66906). The original THC sample was indicated to be 97.3% 1- Δ^9 -*trans*-tetrahydrocannabinol, with the remainder primarily CBN and Δ^8 THC. These materials were stored frozen under nitrogen until used.

In spite of the great care taken to match the THC content of the two cannabis preparations used in Experiment 1,⁴⁴⁰ limitations in the reliability and validity of cannabinoid quantitative analytic techniques available impose some restrictions on the confidence that can be placed on detailed pharmacological comparisons.

- [q] In time production or reproduction tasks, the subject is required to generate a given time interval without the aid of external timing mechanisms. In time estimation tasks, the subject is asked to judge the duration of a given interval.
- [r] Statistical tests based on an analysis of variance were used in some instances and non-parametric methods were applied in others. Generally, the $p \leq .05$ level of significance was employed as the statistical criterion.
- [s] A proposal for an international uniform cannabinoid nomenclature system was made at a recent cannabis symposium in Sweden.⁵⁹⁵

Chapter 3

Legal and Illegal Sources and Distribution of Cannabis

3. Legal and Illegal Sources and Distribution of Cannabis

LEGAL SOURCES AND LEGAL DISTRIBUTION

The *Narcotic Control Act* and the *Narcotic Control Regulations* prohibit the distribution and possession of cannabis and cannabis derivatives, except for purposes permitted by the Minister of National Health and Welfare, such as drug analysis and other scientific research. The details of these provisions are described in the section of this report dealing with law and law enforcement.

Research into the chemical and botanical features of cannabis, as well as its pharmacological effects has, as was noted in the Commission's *Interim Report*, been limited in Canada for many years. In recent months, however, a larger number of projects have been approved by the Federal Government, and work is progressing on a number of these at the present time. We shall consider these projects, as well as Federal policy with respect to research, in a subsequent report.

LEGAL SOURCES AND ILLEGAL DISTRIBUTION

While cannabis is not legally traded in Canada, its recent availability for experimental purposes has created the opportunity for some illicit diversion. The Food and Drug Directorate's marijuana cultivation project at the Experimental Farm in Ottawa was plagued with minor thefts at the end of the summer of 1971. The diversion of legitimately held supplies to illegal consumption, however, is not significant.

ILLEGAL SOURCES AND ILLEGAL DISTRIBUTION

Cannabis is prepared and sold as either marijuana or hashish.^[a] While cannabis users may express a preference for one or the other of these preparations, they will usually purchase whatever is available. Marijuana was more widely distributed in Canada than hashish until fairly recently. Rising demand and prices, intensified border surveillance and the problems of transporting bulk marijuana have, since that time, led to increased importation of hashish; foreign marijuana is now irregularly available in much of the country. British Columbia, probably because of its proximity to Mexico and the large trans-shipment centres in California, remains generally well supplied with marijuana. But, except for occasional shipments of foreign marijuana and some domestic cultivation, cannabis smokers in some areas depend on hashish imports almost exclusively.^[b]

Canadian cannabis seizures, as reported by the R.C.M. Police,^{41,16,17} reflect this shift from marijuana towards hashish. While Table 3 illustrates a rise in seizures of both cannabis preparations over the past four years, it is clear that hashish seizures have increased more consistently and dramatically than seizures of marijuana. Furthermore, marijuana seizures include domestic cultivation as well as intercepted imports.

TABLE 3
CANNABIS SEIZURES, IN POUNDS, BETWEEN 1968 AND 1971,
AS REPORTED BY THE R.C.M. POLICE

Year*	Marijuana	Hashish
1968/69	848	83
1969/70	618	1,171
1970/71	2,692†	826
1971/72	2,511‡	3,418§

*Fiscal years, which begin on April 1 and end March 31.

†Excluding seizures of 26,431 cannabis plants.

‡First seven months only (i.e., until October 31, 1971), excluding seizures of 92,978 cannabis plants.

§ First eleven months only (i.e., until February 29, 1972), as reported to date.

If these quantities of cannabis are converted to their wholesale Canadian value (assuming a per pound selling price of \$750 for hashish and \$200 for marijuana), the recent and increasing predominance of hashish is even more apparent. Table 4 illustrates the approximate value of these same cannabis seizures.

TABLE 4
APPROXIMATE WHOLESALE VALUE OF R.C.M. POLICE-
REPORTED CANNABIS SEIZURES
BETWEEN 1968 AND 1971

Year*	Marijuana†	Hashish
1968/69	\$169,600	\$ 62,250
1969/70	123,600	878,250
1970/71	538,400‡	649,500
1971/72	502,200§	2,863,500

*Fiscal years, which begin on April 1 and end March 31.

†Maximum wholesale value, as these seizures include domestically cultivated marijuana which is less expensive than imported marijuana.

‡Excluding seizures of cannabis plants.

§ First seven months only (i.e., until October 31, 1971), excluding seizures of cannabis plants.

|| First eleven months only (i.e., until February 29, 1972), as reported to date.

Furthermore, if we assume that in Canada, on the average, hashish contains five per cent THC, while marijuana typically contains less than one per cent THC (see Chapter 2, Cannabis and Its Effects), then hashish is apparently from five to nine times as potent as marijuana, despite the fact that it is only three to four times as expensive throughout most of the country.

The Canadian cannabis market, unlike that of heroin, is loosely organized, unstable and, until very recently, relatively free of professional criminal involvement. Some large-scale importation operations are probably controlled or financed by traditional criminal organizations,^{42,28} but most distribution ventures involve 'amateurs' supplementing their conventional income or professional smugglers and dealers whose criminal experience is restricted to the trafficking in illicit drugs.

Goode, in discussing the problem of identifying the extent of organized criminal involvement in American marijuana distribution, has noted that:

If we mean by "organized crime" a syndicate involving thousands of tightly knit, lifelong committed gangsters whose entire livelihood derives from illegal activities, then marijuana is not sold, never has been sold, and never will be sold by professional criminals. If, however, we mean an independent operation involving a score of individuals whose activities are coordinated and who will earn their living for a few years from marijuana sales, then it is true that marijuana is often sold by professional criminals. Just how much of the total of marijuana consumed derives from this kind of source is impossible to determine.²⁷

In Canada, much the same situation pertains. It is extremely difficult to estimate the number of major importing groups in various cities. We have had estimates of as few as four or five, although it appears that, in fact, in the largest cities and their suburbs there may be as many as 20 groups. Each importing group is unlikely to number more than three or four key people who derive their incomes virtually exclusively from cannabis smuggling and large-scale distribution. Apart from this activity, they are usually not involved in professional crime.

The willingness of cannabis producers in most parts of the world to sell to nearly anyone, the hundreds of potential international sources, the absence of the need for chemical refinement, and the relatively loose structure of the domestic market, make it virtually impossible for any one organization to monopolize the distribution system. Any cannabis user (should he be willing to assume the legal and financial risks) can, with little effort or knowledge, become a marijuana or hashish smuggler. For these reasons cannabis trafficking can, to a large degree, be seen as a relatively free market system with many opportunities for advancement to higher and more sophisticated levels of distribution.

It is widely believed by cannabis users that cannabis distribution is totally free of organized criminal involvement. This popular contention is probably the result of two conditions of the cannabis market. First, it seems likely that if 'organized'—or any—professional criminals are involved in the distribution of cannabis, they are involved only in the upper levels of the enterprise (importing and large-scale wholesaling). Second, consumers, in general, are rarely party to the operation of any market above the level of their own

dealings. Consequently, unless cannabis users have criminal friends from whom they purchase the drug (a highly unlikely situation since most consumers buy their supplies from persons they know socially), they will only come into contact with its non-professional criminal personnel. These persons, then, will know the market as they see it, and they tend to see it as an illicit co-operative devoid of organized criminal elements. Goode has made a similar point in discussing the operation of the American marijuana market:

The typical marijuana smoker has no idea where his marijuana comes from. It has been filtered down through so many levels and has exchanged hands so many times, that the average user is no more likely to come in contact with a top-level seller than would a cigarette smoker with a tobacco auctioneer....The chain is long, and the links are many. Each step downward involves a change in character of the personnel.²⁶

Sources

Whether cannabis is originally purchased as marijuana or hashish depends, to a large extent, on its country of origin. Hashish, which is prepared from cannabis and is generally more potent than marijuana, ordinarily comes from the Middle East, North Africa and parts of Asia. The major cannabis-growing regions in these parts of the world are the Rif mountains in Morocco, the mountainous Hermel and Baalbek areas in Lebanon, the foothills of the Himalayas (the source of Pakistani, Nepalese and Indian [Kashmir] hashish) and Afghanistan.^{28,51} Some hashish is also reportedly produced in Mexico.²²

Most of the marijuana entering the North American cannabis market is grown in Mexico, particularly in the provinces of Chihuahua, Coahuila, Sonora, Sinaloa, Nayarit, Jalisco, Durango, Zacatecas, Michoacan, Guerrero, Tamaulipas and Yucatan.^{28,56,59,44,35,22,31} The Mexican marijuana-growing fields are relatively small (one-third to one-half acre) and contiguous to forested areas or in hidden valleys. The plants are sometimes cultivated between rows of corn to protect them from aerial detection. Persistent attempts to eradicate Mexican marijuana cultivation, intensified border inspections, and the explosive North American demand for marijuana over the past few years, have led to the importation of this drug from other countries. Mexico remains the most significant source, but smugglers have increasingly turned to Central and South America (particularly Panama and Colombia), the West Indies (particularly Jamaica), and even parts of Central Africa to meet the spiralling North American demand. The Vietnamese war has also opened new cannabis routes as Laotian, Vietnamese, Thai and Cambodian marijuana is apparently regularly mailed or smuggled into the United States by American soldiers. Some of this marijuana eventually reaches Canadian consumers.

In all of these growing regions, cannabis represents an important cash crop. No substitute crop of equal value to the farmers has yet been found. Were cannabis not cultivated, these farmers would, in most cases, barely manage to subsist; consequently, they strongly oppose any attempts to eradicate what is not only a traditional occupation but also, and more importantly, the source of their livelihood.

The final cannabis source for Canadian users is domestic marijuana cultivation. Cannabis will grow nearly anywhere and wild strains persist across the country.^[c] The more psychoactive plants, however, are deliberately cultivated from the seeds derived from high quality imported marijuana. These plants are grown at home under artificial lighting systems of various degrees of sophistication during the winter months, or carefully planted in window boxes or rural areas during the spring.^[d] Late summer harvests provide a temporary surfeit of marijuana throughout the country, although most of these supplies are judged to be inferior to imported cannabis by experienced users. Domestic marijuana cultivation represents an important supplementary source of the drug and one that is becoming increasingly significant as marijuana imports apparently continue to decline on a per user basis.

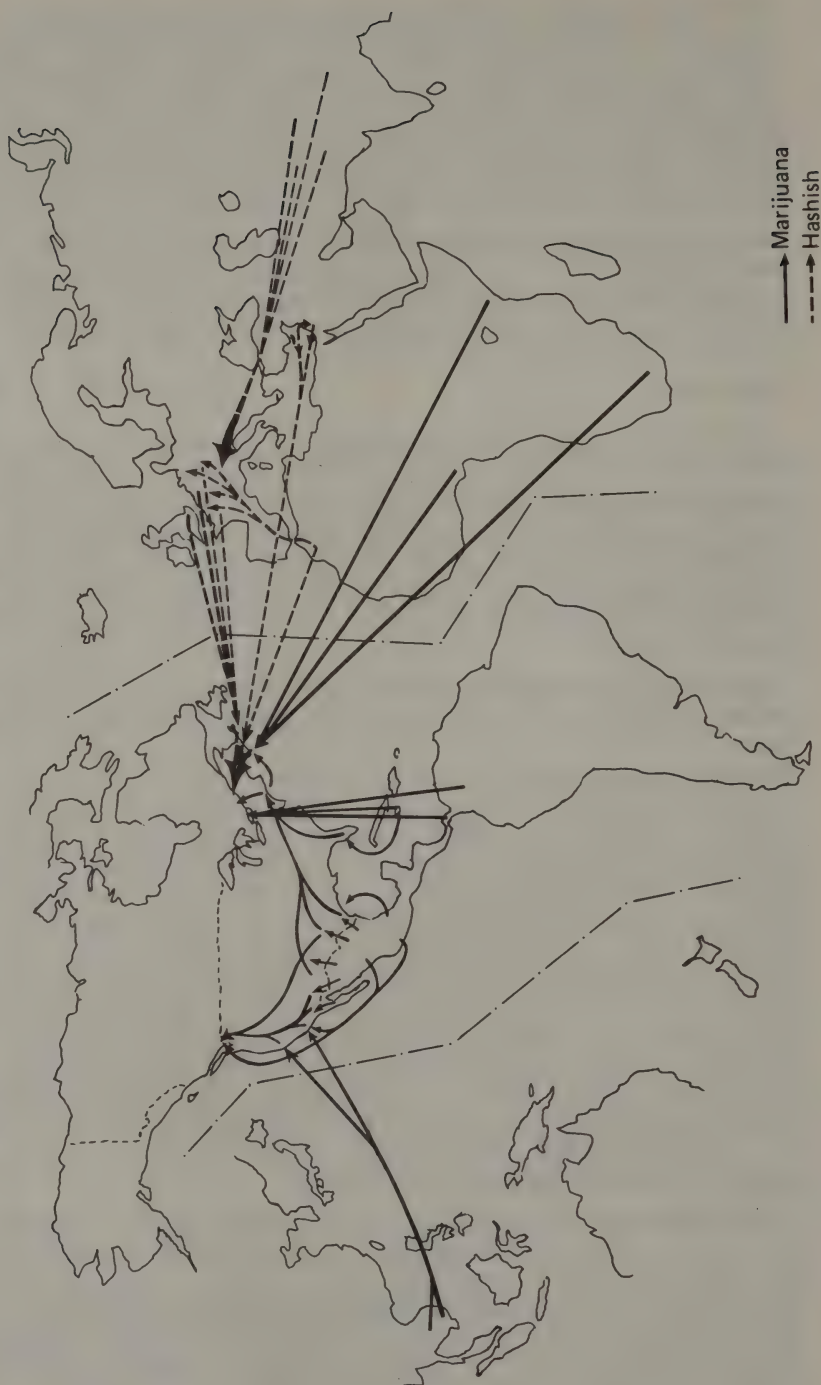
Importation

Hashish, by virtue of its compactness, is far easier to smuggle across international borders than marijuana. Both preparations, however, are relatively bulky (compared, for example, to heroin or cocaine) and can be easily detected by trained customs dogs. Consequently, the commercial importation of cannabis, except for very small amounts, is a risky operation that requires careful planning and knowledge of both smuggling techniques and safe routes. The primary routes of cannabis delivery to Canada are indicated in Figure 4.

Depending on the quantity and quality purchased and the country of origin, hashish costs between ten and eighty dollars a pound at its production source.^{28,1} However, North American importers (especially those who are relatively inexperienced or cautious) often buy their hashish in trans-shipment centres in Israel or Europe (particularly Amsterdam, Paris and London), so as to minimize the number of border crossings and avoid suspicious immigration stamps in their passports.^[e] Hashish costs between two hundred and three hundred and fifty dollars a pound in Europe, but even this price still allows the smuggler to at least double his money on return to Canada or the United States. Large-scale hashish smuggling operations may involve the purchase of hundreds or even thousands of pounds of hashish in the Middle East or North Africa which is then transported to North America through various strategies. Some of these large shipments are flown close to the Canadian and American east-coast borders where they are then 'dropped' for later pick-up by boats owned or rented by these organizations. Other shipments are concealed in legally imported large machinery or motor vehicles, and some is smuggled into Canada by foreign diplomats whose personal property is immune from customs inspection.

The development of these large-scale hashish smuggling operations is a relatively recent phenomenon, probably dating from 1967 or 1968. Until that time hashish was usually imported, a few pounds at a time, by individual entrepreneurs or small groups of semi-professional smugglers in their late teens and early twenties. This style of importation still exists and probably accounts for the majority of hashish smuggling operations. The bulk of Canadian hashish importation, however, appears to be increasingly controlled by adult professional criminals, and the 'free market-place' notion that

FIGURE 4
MAJOR INTERNATIONAL CANNABIS ROUTES TERMINATING IN CANADA



once characterized hashish trafficking is now applicable primarily to the lower levels of domestic distribution.^{7, [1]}

Individuals or small groups who participate in the smuggling of hashish ordinarily employ two methods of importation. The first involves the personal transportation of hashish through customs after disembarking from a transatlantic flight or cruise.^[8] The hashish is usually taped to the person's body and unless a customs inspector is inordinately suspicious the smuggler will not be 'body-searched'. This technique, however, only allows the smuggler to import between five and ten pounds of hashish at a time. For this reason some smugglers take the added risk of concealing additional hashish in their baggage, particularly in especially constructed false-bottom suitcases. Professional importation organizations will often hire 'runners' or couriers to transport hashish to North America using these techniques; the runners are either paid a set fee in advance (per delivery) or receive a per pound or kilogram (2.2 pounds) fee upon receipt of the goods by the importer.

One major importer, in a discussion with a Commissioner, described his couriers and their risks in this way:

His [the courier's] chances of making it through, unless there is a tip-off, are just unbelievably good—I'd say 99% plus. I lost one runner, but that was obviously a tip-off; he was hit stepping off the plane—they got him before he even got to customs.

[For couriers] you have to hit a certain type of person—hippies are no good. The best people are high school and college drop-outs—fairly straight kids who work and smoke a bit....They don't really realize the consequences of what they are doing. A hippie knows what jail is like and he knows that if they hit you it's seven years....

[My runners] are worker types; when somebody is making thirty or fifty bucks a week they are not really very educated, otherwise a few dollars wouldn't appeal to them as much.

...using the body-run system I was paying them \$500 for the first four kilos and \$250 for each additional kilo.

I am willing to use somebody two or three times in the course of...two or three months, but after that their nerves start to give out.

...anybody that is going to run drugs for \$750 is a fool...so you can't really get an intelligent runner because an intelligent person wouldn't.

Not all would agree with this rather harsh judgement of the intelligence of runners in general. In fact, some large-scale importers of considerable business acumen began their careers as couriers.

The second and generally safer method of importation involves the use of the mails. The hashish, in this case, is usually hidden in parcels of food or hollowed-out souvenirs, or canned to appear as food. It is then mailed to someone (who may or may not exist) or to an institutional address in Canada and is accepted by the Canadian-based partner or one of his agents. Should there be any reason to suspect that the authorities are aware of the package's contents, delivery is not accepted and the police are left in the position of having to construct a conspiracy case in order to secure a conviction. The Christmas season is considered the most opportune time for such mailings,

but hashish importation of this nature continues throughout the year. Some distributors regularly import hashish through the mails from European residents, telegraphing the necessary funds in advance and co-ordinating the entire venture by long-distance telephone calls. Others have established legitimate importing companies which are then used as a 'front' for hashish smuggling, the drug being hidden among the declared goods. This style of operation has, in many instances, continued in an uninterrupted fashion for several years.

In contrast to the hashish market, the importation of marijuana into Canada remains relatively unorganized and unaffected by professional criminal syndicates. Most marijuana entering the North American cannabis market is grown in Mexico, and according to one authority, "...no evidence exists to support a belief that traditional organized crime—the Mafia—is involved to any significant degree in marijuana smuggling."³⁵ Marijuana is easily available throughout Mexico and nearly anyone with the right contacts and sufficient funds can buy as much of the drug as he desires. A ton of marijuana can be purchased for between ten and twenty thousand dollars (between five and ten dollars a pound) from a Mexican farmer or broker. Smaller purchases, of course, are more costly on a per pound basis (as high as forty dollars a pound), as are deals in which the Mexican wholesaler assumes the risks of transporting the drug to the American side of the border. But, as Mandel has noted:

...acquiring *mucho* marihuana does not require the capital outlay of behind-the-scenes financiers of the Syndicate. To the contrary, the price is right for the operation of the free market.⁴²

According to McGlothlin, an "average of about 3 tons of marijuana per day is estimated to be smuggled from Mexico into the U.S...."⁴⁴ There are primarily three groups involved in this importation. The first, suggests King, is composed of traditional Mexican and Mexican-American organizations which "...deal in large shipments and are said to account for a major portion of the Mexican marijuana smuggled into the United States",^{35,[h]} The second group of smugglers are young Americans whose expeditions range from small-quantity, one-shot ventures to highly sophisticated, regular and well financed operations which import marijuana in shipments that rival those of the established Mexican-American organizations. Finally there are those young American amateurs, mainly tourists and vacationers, who attempt to cross the border with small amounts of marijuana concealed in their vehicles or on their person. While these amateurs account for most of the border seizures, their successful imports represent a very small fraction of the total amount of marijuana transported into the United States.^[i]

Only the first two of these groups are involved in the wholesale purchase of Mexican marijuana from farmers or their brokers. This harvested marijuana, after being compressed into kilogram blocks about the size and shape of cigar boxes, is moved by burro from the mountainous growing areas. It is then transported northward or to coastal shipping centres by truck or private plane. According to Kamstra:

Before Operation Intercept [September, 1969] the use of cars and trucks was by far the most popular method of smuggling. Land traffic has slowed since

Intercept, but there are still plenty of smugglers who run the border with their vehicles, mainly the big time Mexican/American smugglers who operate along the Texas border and who [move]...tons of weed [marijuana]...with considerable elan through a variety of check points and officials, each official taking his "bite" as the load moves north.³¹

These overland shipments are ordinarily subdivided into smaller lots for transport across the California, Arizona, New Mexico or Texas borders, the actual importation being performed by hired couriers ('mules') who are paid a set fee for each delivery.

Because of the risks involved in driving across the American border, marijuana smugglers have increasingly utilized private planes and boats to transport their shipments. Kamstra claims that United States Air Force trained Vietnam veterans are often employed in smuggling operations involving airplanes, and that "[t] here are hundreds of small airstrips hacked out of the mountains in Mexico and a pilot with a good eye and lots of nerve can make it in and out of a strip in fifteen minutes, provided his organization has his weed and spare fuel ready."³¹ Smuggling by boat is equally popular as Mexico's lengthy and convoluted coastline provides ample opportunities for hidden loading operations. Three miles from Mexico these boats are safely in international waters, and in five or six days they reach their pre-arranged rendezvous along the Texas or California coast. Once having arrived in the United States, the marijuana is driven or air-freighted to its eventual import destination where it is subdivided for further sale.⁶¹

It is at this stage that Canadian smugglers ordinarily become involved in the importation of Mexican marijuana. Some Canadian importers, particularly prior to Operation Intercept, engaged in the regular wholesale smuggling of marijuana, hiring couriers to cross both the Mexican-American and American-British Columbia borders. In a very few instances boats were used to move large shipments directly from Mexico to the British Columbia coast. This style of operation has generally disappeared and most Canadian importers now purchase their marijuana in American trans-shipment centres (such as San Diego, Los Angeles, San Francisco, Chicago, Detroit, Boston and New York) and arrange for its overland transport into Canada at what are thought to be poorly guarded border crossings or along back roads that are free from regular customs and immigration check points. Marijuana reaching Vancouver is occasionally driven or mailed to distributors east of British Columbia.

Small supplies of marijuana also enter Canada through the mails, the same techniques as described for hashish being employed. Most marijuana imports from Jamaica arrive in this fashion, as do small shipments from parts of Central and South America and Africa. Legitimate importing companies have also been used to smuggle marijuana into Canada from these more exotic locales. Because the distances and risks are identical, however, most Canadian importers prefer to smuggle hashish rather than marijuana since it is less bulky and guarantees a larger return on their investment.^{12,[k]}

Domestic Distribution

Once cannabis reaches Canadian dealers, the selling price for various quantities is roughly standardized at each distribution level. Imported marijuana is likely to cost less in British Columbia than the eastern provinces and the converse may be true for hashish; but, generally speaking, the per unit selling price for cannabis shows little variation across the country except in times of local shortages or over-supply.

The estimated market value of marijuana or hashish, as was noted in the Commission's *Interim Report* (Paragraph 275), is most accurately represented by its replacement cost to the individual possessing the drug. Police and other officials frequently report the value of cannabis seizures in terms of the estimated final selling price. Goode, in commenting on this practice, has stated:

A given bulk quantity of marijuana in a dealer's living room or garage automatically is worth less than if it is split up and distributed among his customers. Selling marijuana, at least at the dealer-to-user level, is hard work; each deal involves a certain amount of moving about and a lot of socializing....The final product is saturated with the value of labor. Thus, a dealer's cache of several kilograms is worth the kilogram price....If sold to the customer, ...[a marijuana] ...cache might eventually earn twenty dollars per ounce..., but the point is, it *hasn't* been sold to the customer, and it is, therefore, worth correspondingly less.²⁷

There are at least two, and sometimes as many as seven, levels of cannabis distribution between the importer and the final purchaser of the drug, depending on the initial quantity imported and the risks a dealer is willing to assume. Small quantity imports may be sold in pound-fractions or ounces directly to consumers or middlemen; but operations involving hundreds of pounds of cannabis are more likely to pass from the importer through wholesalers, 'big dealers' (several pounds at a time), pound dealers, quarter-pound dealers, ounce dealers, and quarter-ounce or 'dime' (ten dollar) and 'nickel' (five dollar) dealers before reaching the eventual consumer. Every subdivision increases the selling price of cannabis as every dealer adds his mark-up. A pound of hashish costing forty dollars in the Middle East may, in fact, realize sixteen hundred dollars (at twenty-five dollars per quarter-ounce) in Canadian street sales. But these profits are almost always dispersed among a large number of middlemen who must also subtract their transportation costs, expenses and personal consumption from the profit garnered from each transaction.

Importers account for a larger percentage of this cannabis profit than any other level of dealer, but they also assume tremendous risks and bear the heaviest expenses. Once having arrived in Canada they arrange to sell their supplies, 'cash-on-delivery', as quickly as possible to local wholesalers. The minimum order is usually several kilograms and the wholesalers pay between four hundred and six hundred and fifty dollars for each pound of hashish or between one hundred and fifty and two hundred dollars for each pound of marijuana. In an interview in a Toronto underground paper, one large-scale, experienced dealer described a hashish wholesaler's role in the following fashion:

The wholesaler has a very complicated organization. He does the fronting

[consigning]. He fronts it out in blocks of ten to people who sell in pounds. He gets paid later. He takes the most risk and the second highest profit....

[He sells it for] a small differential, \$25 to \$50 a pound....His particular job is to be very quick, to have a lot of trustworthy people he can front it out to as soon as he gets it. If he takes 50 pounds and makes \$25 on each, he makes \$1,250. He should be able to do that in a month or less.¹³

Beyond this level of dealing the pattern of cannabis distribution becomes increasingly confusing as dealers purchasing identical amounts may subdivide their supplies into different units of re-sale, thus producing differential profit-margins. Generally speaking, however, pounds of hashish sell for between six hundred and fifty and eight hundred dollars, quarter pounds for between two hundred and two hundred and fifty dollars, ounces for between sixty and eighty dollars, half-ounces for between thirty-five and forty-five dollars, quarter ounces for between twenty and twenty-five dollars, and one to three grams for between five and ten dollars. Bulk marijuana is not usually divided as finely as hashish, and the selling price is significantly less expensive on a per-weight basis.^[1] Pounds of imported marijuana usually wholesale for between one hundred and seventy-five and two hundred and twenty-five dollars in Canada while ounces ('lids') cost between twenty and twenty-five dollars, and approximately one-quarter ounce 'dime bags' sell for ten dollars. Ounces of domestic marijuana will only realize between ten and fifteen dollars in the Canadian cannabis market.^[m]

Whether an individual pays the high or low end of the unit price range depends on the quantity of cannabis purchased, the quality of the drug, his experience in such transactions, and his relationship with the dealer involved. In an effort to economize, cannabis users will either buy more marijuana or hashish than they would ordinarily consume by themselves (intending to sell some of their purchase to friends) or pool their funds with others so as to obtain a quantity discount. Goode, in explaining this tendency to purchase in larger units of sale, has noted that:

Economy is part of the motivation; obviously, the larger the size of the purchase, the lower the unit cost. It is also to the advantage of the purchaser to minimize the number of transactions in which he is involved: the greater the number of purchases he makes, the greater the chance of coming into contact with an undercover agent and getting arrested. As the user becomes increasingly sophisticated about the workings of the market and the activities of law enforcement agencies, the size of his purchase increases correspondingly.²⁷

Apart from the giving away or ritual sharing of marijuana and hashish (both of which legally constitute trafficking), it is apparent that a large proportion of cannabis users also sell the drug. Forty-four per cent of Goode's sample of two hundred marijuana users had sold cannabis at least once, the most important intervening variables being the frequency and regularity of personal consumption.²⁷ Goode, in describing this confusion between user and seller, has commented that:

Generally, selling must be considered as part of the syndrome of use. It is not simply that the user must purchase his drug supply from the seller to consume the drug (this symbiotic relationship exists with heroin as well), but that the user and the seller are largely indistinguishable; there is no clear-cut boundary between

them. A large percentage of users sell, and nearly all sellers use....Selling marijuana, then, to some degree presupposes involvement with the marijuana subculture which, in turn, implies at least a moderate degree of use....The difference between [using and selling] is simply a matter of degree, since selling is a surer indicator of one's involvement with the drug subculture than is buying or, even more so, using. To think of the dealer as preying on his hapless victim, the marijuana smoker, as profiting on his misery, is to possess a ludicrously incorrect view of the state of affairs.²⁷

Part of the problem of distinguishing sellers from users revolves around the fact that many cannabis dealers below the pound level of distribution are 'amateurs' who have other primary income sources. Generally speaking, these non-professional cannabis dealers sell marijuana or hashish to cover their personal consumption, generate a small supplementary income, or to satisfy the persistent requests of friends who have difficulty securing their own supplies. These persons almost always deal in small amounts for little or no profit, and their sales are to friends and acquaintances whom they have known for some time.

At the other end of the low-level dealing continuum, however, are those persons (most clearly represented by 'street-dealers'^[n]) who always deal for profit, and often to strangers or near-strangers.^[o] These low-level dealers (some of whom derive their entire income from cannabis transactions) are unlikely to earn substantial amounts of money. There is, in fact, very little money to be made from cannabis dealing below the pound level of distribution. Even career 'street-dealers' make most of their profits from the sale of other drugs. As Mandel has noted, the "...more successful street-pushers in fact handle about everything but pot because of its large bulk and small profits per deal."⁴² Their continued participation in cannabis distribution, then, must also be explained in terms of what they define as the lack of attractive jobs, the "cloak and dagger" intrigue involved in dealing, and the prestige and status imputed to dealers by members of the cannabis subculture.^[p] In return for these monetary and social rewards, a regular cannabis seller must deal with the inevitable 'hassles' of leakage (underweight purchases, give-aways, personal consumption, thefts,^[q] and sales on credit that are never repaid), maintaining a reputation, packaging and delivering, and the constant fear of detection and arrest. The monetary return alone does not seem to justify the risks or labour involved in this venture—and yet thousands of persons continue to participate in low-level cannabis dealing.

It appears, then, that the differences among those who traffic in marijuana or hashish can be best described by referring to their motives for doing so. While some supply their less well-connected friends as a favour or as a means of financing their own use, others do in fact engage in cannabis distribution as a commercial enterprise. The co-existence of these two types of cannabis sellers—at every level—makes it difficult to specify who is an entrepreneur and who is not. For example, while some persons import marijuana with the intention of "setting up a business", some do it for other reasons. While, for some, a kilogram of hashish is purchased to be divided and resold at a profit, others buy that quantity merely for distribution at cost among their friends. The quantity of cannabis possessed by an individual, then, is in many cases a rather inexact predictor of his intentions vis-a-vis the commercial distribution of the drug.

NOTES

- [a] Cannabis preparations such as THC are available solely for experimental purposes. Canadian 'street' samples of this drug have always been found to be some non-cannabis substance or another cannabis preparation.
- [b] There are probably some groups of persons in every large Canadian city who, through various means, are assured of regular supplies of marijuana. These shipments rarely reach the street, however, and are usually too small to affect the overall availability situation.
- [c] In the American midwest there are still thousands of acres of cannabis which were originally cultivated for the United States government during World War II as a source of hemp for rope manufacture.^{54,24,34}
- [d] Much of this 'home-grown' marijuana is neither marketed nor intended to be marketed. Rather, it is generally consumed by its cultivator and those with whom he is friendly. Increasingly, however, some persons have been cultivating cannabis on a commercial scale. For example, the latest Canadian census has found that "...marijuana has become a major cash crop for some farmers, representing all age groups, in several provinces."⁷
- [e] Regular hashish smugglers will occasionally 'lose' their passports, enabling them to obtain a new passport free of any indication of the frequency or direction of their recent travels.
- [f] Some large-scale importers apparently use Canadian ports of entry as trans-shipment centres for hashish destined for the American market. Hashish arriving in Montreal and Toronto is regularly transported to the United States along border patrol-free roads between Quebec and Vermont,⁴ and recently the R.C.M. Police in Red Deer, Alberta intercepted a six hundred pound shipment of Afghanistan hashish which had been flown from Europe to Edmonton and is said to have been intended for Denver, Colorado.^{5,6}
- [g] Hashish smugglers will occasionally travel to the West Indies before entering Canada or the United States, as it is believed that flights originating from these countries are less closely inspected than flights from Europe.
- [h] Single shipments in excess of one ton are not uncommon; a single recent American marijuana seizure weighed ten thousand pounds.^{62,32}
- [i] American customs officials seized nearly 150,000 pounds of marijuana during the twelve months ending June 30, 1971.⁵⁸ If, at best, this represents ten per cent of all marijuana border traffic, then it can be estimated that nearly eight hundred tons of marijuana illegally entered the United States during that year. McGlothlin has estimated that eleven hundred tons of "crude" marijuana are annually consumed in the United States, but this figure includes domestic cultivation.⁴⁴
- [j] Boats have also been used to transport large quantities of Jamaican

marijuana to the United States. One recent American case involved the seizure of three tons of marijuana which had been shipped from Jamaica to Florida and then transported by truck to the New York City area.³²

- [k] The fact that trans-atlantic "youth fares" are less expensive than regular passage to Mexico or Jamaica has also probably contributed to the increase in Canadian hashish smuggling and the decline of interest in marijuana importation ventures.
- [l] Marijuana is, of course, usually less potent than hashish on a per unit weight basis and, therefore, is consumed far more rapidly.
- [m] Individual marijuana cigarettes, although often used as the unit of calculation for police estimates of marijuana seizures, are almost never trafficked in the North American cannabis market. This practice, however, was apparently quite common in the 1930s and 1940s.²⁷
- [n] A description of Canadian street scenes appears in the next section of this report which deals with North American Patterns of Cannabis Use.
- [o] In regard to this typology of dealers, Goode has observed that:
 ...there is an entire *continuum* between these two types, with mixed characteristics. But in terms of sheer number of transactions—because the product is finally fanning out to the consumer and is, therefore, small in bulk and large in number—the friendship end of the spectrum is far more common than the profit end.²⁷
- [p] McNeill has observed that:
 The dealer commands a certain mystique....He is playing a far more dangerous game than the consumer and he is respected for it....Most dealers are proud of fine scales, and enjoy the ritual of sifting and weighing their stock. The exchange, sometimes involving large amounts of cash and drugs, is the climax of the business and may have an 007 sort of intrigue.⁴⁵
- [q] Professional criminals, in such cities as Montreal and Ottawa-Hull, have been increasingly involved in the systematic, and often violent, theft of hashish from dealers who operate independent of the organized criminal distribution network. The victims, of course, suffer the additional frustration of being unable to report such thefts to the police.

Chapter 4

Patterns and Extent of Cannabis Use

4. *Patterns and Extent of Cannabis Use*

SOCIAL HISTORY OF CANNABIS USE IN NORTH AMERICA

Popular use of cannabis by Europeans and North Americans is a phenomenon of the second third of the twentieth century. The development of popular North American use of cannabis does not appear to have begun until the turn of this century in the southern United States. There was a slow spread of use in North America up to the 1950s and 1960s when the incidence of use began to increase sharply. This development was followed by the diffusion of cannabis use to Europe and areas of European influence and settlement, such as Australia and New Zealand.

Mexican migrant workers are reported to have introduced cannabis smoking into the southwestern American states by around 1910.^{30,72} Marijuana (originally a Mexican word) had been used in Mexico since at least the late 1800s and was widely available throughout that country in the first part of this century.⁹⁶ The Mexican migratory labourers spread the cannabis smoking practice to many Mexican-Americans and to some of the cowboys they encountered, probably in Texas.^{72,96} About 1915 some American soldiers and civilians experimented with cannabis after contact with Pancho Villa's army which was reputedly composed of devoted marijuana smokers.⁹⁶ Other American soldiers were introduced to cannabis in the American controlled Panama Canal Zone around 1922.^{18,84} A United States Army study conducted in 1931 and 1932 found that 20% of the American personnel in one of the Panama bases smoked marijuana.⁸⁴

The first American city where marijuana use was a publically identifiable social phenomenon was New Orleans, where the drug was introduced about 1910⁹⁶ and where it had become quite popular by the mid-twenties.¹⁷ This development has been attributed to both the diffusion of the marijuana smoking practice from Mexican-Americans to blacks⁷² and to the influence of visiting American and Latin-American sailors who had experimented with cannabis elsewhere.^{30,51} Some of these sailors imported the drug to New Orleans from such cities as Havana, Tampico, and Vera Cruz, buying it for around ten dollars a kilogram (2.2 pounds) and selling it for up to five times that amount in the United States.⁹⁶ Throughout the twenties and thirties New Orleans served as the major American marijuana distribution centre with the drug being shipped up the Mississippi to other large urban areas.^{17,30} Mezz Mezzrow, a white jazz musician writing of the American twenties, noted, "...the real jazz, like the real marijuana, comes from the bayou country."⁶³

Black jazz musicians were among the first to smoke marijuana in New Orleans. Their appreciation of the drug was soon transmitted to their fans, fellow musicians, and other lower class urban blacks throughout the United States. Marijuana diffusion across racial boundaries to white jazz musicians and other members of the entertainment industry and the criminal fringe associated with that industry generally occurred in the early 1930s, although white jazz musicians in Chicago and Detroit had used the drug at an earlier date.^{72,63} The prohibition of alcohol by the *Volstead Act* in 1919 is also said to

have contributed to the spread of marijuana during the 1920s and early 1930s.⁹⁹

The use of marijuana was also noticed in Canada during the 1930s. According to an article in a 1934 edition of the Canadian Medical Association Journal, marijuana was being used in Ottawa, Toronto, Montreal and Windsor and was reported as being "...very popular on the Pacific coast".⁸ The drug was usually imported from such places as Detroit, New York, Kingston (Jamaica) and West Africa, and was sold at prices of around one dollar for a marijuana cigarette.⁸

The use of cannabis was prohibited in Canada through its inclusion in the schedule of the *Opium and Narcotic Drug Act, 1923*. However, some medicinal preparations containing cannabis were still available for a number of years; several over-the-counter remedies (primarily cough syrups and corn removers) were sold until 1939 and a few prescription compounds were available until the 1950s. (See previous chapter, Cannabis and Its Effects.)

In 1938 Fiorello La Guardia, as mayor of New York, asked the New York Academy of Medicine to inquire into the use of marijuana in that city. The report of the committee that was subsequently appointed, popularly known as the La Guardia Report, was published in 1944. The summary of this report states:

...the Committee came to the conclusion that marijuana distribution and usage is found mainly in Harlem, the population of which is predominantly Negro and Latin-American, and to less extent in the Broadway area....The local supply comes from individual peddlers and from "tea-pads", which are establishments for marijuana smoking...a conservative estimate being that there are some 500 peddlers and 500 "tea-pads" in Harlem.

The marijuana users with whom contact was made in this study were persons without steady employment. The majority fall in the age group of 20 to 30 years. Idle and lacking initiative, they suffer boredom and seek distraction. Smoking is indulged in for the sake of conviviality and sociality because it affords a temporary feeling of adequacy in meeting disturbing situations.

The confirmed user smokes 6 to 10 cigarettes a day. The effects are easily recognized by the smoker, the desirable stage being what is known as "high". When this is reached the smoking is stopped....

In most instances, the behavior of the smoker is of a friendly, sociable character. Aggressiveness and belligerency are not commonly seen....

The marijuana user does not come from the hardened criminal class and there was found no direct relationship between the commission of crimes of violence and marijuana....⁶⁰

Prior to the Second World War marijuana smoking in the United States was primarily restricted to underprivileged, minority and marginal groups such as Mexican- and Spanish-Americans, blacks, sailors, musicians, criminals, and a few individuals on the bohemian fringe.^{30,53,72} During World War II, however, many soldiers of middle class origins were introduced to cannabis through their association with marijuana smokers in the American Army.³⁰ Their return to college campuses under the *GI Bill* at the conclusion of the war further contributed to the spread of marijuana use. The acceptance

and publicizing of the drug by members of the Beat movement (including such widely read authors as Jack Kerouac, William Burroughs and Allen Ginsberg) during the fifties, and the accompanying growth of a white middle class audience for jazz music also played a role in the diffusion of cannabis-smoking.^{17,30,35,52,62,72,74} Polsky has even suggested that:

The “beats” most enduring imprint on American culture appears, in retrospect, to have been precisely this diffusion of marijuana use to many circles of middle- and upper-class whites outside the jazz world.⁷²

By the early sixties marijuana use was well established in many American universities and among many high school aged youths. In Canada, however, cannabis use was still rare. One study sponsored by the Narcotic Addiction Foundation of British Columbia states that marijuana smoking was *en vogue* among aspiring artists in Greater Vancouver around 1958.⁷⁰ But in 1961 an article in *Addictions* (a journal published by the Addiction Research Foundation of Ontario) was still able to report that marijuana “...does not appear to be a problem [in Canada]”.⁹ To some degree, however, this conclusion may have been a consequence of the clandestine use of the drug and of the paucity of media attention. The authors of one field study of marijuana use in the Toronto area (conducted in late 1965 and early 1966 but designed to cover the previous five years) estimated that there were 2,900 cannabis users in the city.²⁶ Based on their extensive interviews with one hundred persons they reported that this population was composed of three categories of users: “The Beats”, who were usually under twenty-five and inhabited “the Village” section of downtown Toronto; “The Swingers”, who were mainly criminals, members of the criminal fringe and entertainers between the ages of thirty and forty-five; and “The Squares”, who were upper-middle class, well-educated professionals between thirty-five and fifty years of age. These researchers suggest that the development of marijuana smoking by the beats had been primarily responsible for the doubling of the population of cannabis users in Toronto between 1960 and 1965. But it is apparent, from their data, that there was considerable marijuana use in Toronto in the early and mid-fifties. They found, for example, that “...65% of the [Swingers] had used Marihuana for at least ten years” and the Squares “...reported that they had experimented with Marihuana in various parts of North America and Europe for the past ten years.”

The American involvement in the Vietnamese War has been another factor in the rapid proliferation of cannabis use in the United States during the past few years. Widespread consumption of cannabis among American forces in Vietnam, where potent marijuana is readily and inexpensively available, first came to public attention in 1967. A survey conducted among enlisted men at that time found that just over 30% of the respondents had used marijuana and that nearly two-thirds of these began their use while in Vietnam.⁷⁵ While extent of use estimates have ranged as high as 75%,⁹⁰ a recent and reliable United States House of Representative Armed Services Special Subcommittee report stated that between 50 and 60% of the soldiers stationed in Vietnam had at least experimented with marijuana.⁹³

By the mid and late sixties—due, in part, to the evolution of the psychedelic

ethos, the growth of underground newspapers, and the mass media's attention to the drug—cannabis use had spread to most sectors of American society. This diffusion process was repeated in Canada by the end of the decade.

Throughout the United States (particularly the southern and west coast states) and British Columbia the most commonly used form of cannabis is marijuana. In eastern Canada hashish predominates, and marijuana (except during the early autumn when illicit domestic crops are harvested) is increasingly less available in quantities sufficient to meet the local demand. Hashish was reported as the "most readily available" drug by three times as many Canadian cannabis-using university students as those who named marijuana as the "most readily available", British Columbia being the only region where marijuana was claimed to be more easily available than hashish.⁴⁹ In the Commissions's high school survey a nearly equal number of cannabis-using students reported that marijuana was as available as hashish nationally and, regionally, in the Atlantic and Prairie provinces and Quebec. Most Ontario respondents, however, stated that hashish was more "readily available" than marijuana while the reverse was true in the case of British Columbia.⁴⁸ Hashish, of course, is usually several times more potent (and expensive) than marijuana on a per unit weight basis, but the patterns of use, the social characteristics of the users, the effects of the drug, and the avenues of initiation are essentially the same for both.

THE SOCIAL CAREER OF THE CANNABIS USER

Becker^[a] has discussed the processes by which individuals come to experiment with cannabis and by which some come to be regular users.^{11,12,13} He has applied the concept of 'social career' to the phenomenon of cannabis use. He posits a sequence of three stages that may be passed through—beginner, occasional user and regular user—and attempts to explain the necessary conditions for movement in either direction between the stages. In this discussion, we will, to a large extent, make use of Becker's model.

Becoming a cannabis user depends on a willingness to try the drug. While novices may be initially apprehensive about such experimentation, they have all previously heard about marijuana or hashish, and the primary motivation for initial use in North America is overwhelmingly reported to be curiosity.^{10,21,22,31,44,48,49,67,68} A willingness to try cannabis, however, is only likely to develop, Becker suggests, if an individual effectively deals with three mechanisms of social control that may restrict his career advancement: limited availability, the need for secrecy, and public definitions of the act which render it immoral. The user's progression through the various cannabis career stages depends on his successfully neutralizing these controls.

At one time, beginning a cannabis career required gaining access to a relatively esoteric and unconventional group through which the drug could be obtained. The present widespread use of marijuana and hashish has reduced the need for such affiliations, and availability does not now constitute a major problem for those who are willing to try the drug, particularly for those living in large urban communities. Cannabis products are readily available in most

high schools and universities,^[b] and regular users (who can serve as likely sources of supply) are publicly recognized as such. One survey (specifically designed to test Becker's hypotheses) conducted among one hundred and thirty-six randomly selected students at Sir George Williams University in Montreal in 1969 found that nearly two-thirds of the non-cannabis using students knew someone from whom they could obtain marijuana or hashish.¹⁰ Only ten per cent of these non-users "felt that it was impossible to obtain marijuana" while thirty-five per cent of these same students stated that cannabis would be "very easy" to secure. Consequently, it appears that active participation in a cannabis-using group is no longer a prerequisite for initial experimentation, although most persons still try the drug in a social rather than private setting.^[c]

A second condition a beginner must overcome if marijuana or hashish use is to be risked is the fear that one may suffer negative sanctions as a consequence of others discovering his cannabis consumption. This need for secrecy, which a novice may feel makes such a course of action inexpedient, is challenged, in Becker's words:

...by the sight of others—more experienced users—who apparently feel there is little or no danger and appear to engage in the activity with impunity....Participation with other users thus furnishes the beginner with the rationalizations with which first to attempt the act.¹²

The widespread use of drugs in North American high schools and universities and the increasingly tolerant attitude displayed by officials in these institutions (particularly, but not exclusively, at the college level) has generally diminished the need for secrecy; those prone to react negatively have, in the past few years, been reduced, for students, almost exclusively to parents and the police. Cannabis use is still rarely public or publicized, but the fear of exposure and the need for deliberate concealment of the experience is no longer a matter of major concern, even for beginners.⁸⁰

Conventional attitudes which characterize drug users as irresponsible and irrational must also be neutralized if one is to try cannabis. This concern on the part of the potential user, like the other mechanisms of social control which restrict such experimentation, seems to have recently lost much of its inhibitory force for many of our people, particularly the young. The diminishing impact of conventional morality is likely due, in the first place, to the fact that marijuana and hashish smokers are viewed differently from 'hard drug' users by most young people^[d] and, in the second, to their direct knowledge of cannabis-using friends and acquaintances who do not exhibit socially or personally adverse effects as a consequence of their consumption. As most cannabis beginners are initiated by experienced friends and many have had an opportunity to witness actual use by others prior to their own first use (approximately 30% of the non-using population according to one American survey²⁸), the traditional wisdom regarding the effects of the drug is challenged and, very often, successfully overcome. By way of illustration, the Sir George Williams University survey found that only 10% of non-users claimed 'immorality' as their primary rationale for abstention, and the authors of this study concluded that "[t]he control of immorality...cannot be

viewed as an active obstacle to participation in the counter-institution [of cannabis-smoking].^{29,10,[e]}

Goode has suggested five interrelated factors, independent of opportunity, that affect the likelihood of an individual trying cannabis:

- (1) The initiate's perception of *danger* (or the lack thereof) in marijuana use;
- (2) His perception of its benefits;
- (3) His attitude towards users;
- (4) His closeness to marijuana's endorsers;
- (5) His closeness to the individual trying to turn him on.³¹

Forty-six per cent of Goode's 200 marijuana-using respondents had, in fact, refused opportunities to try marijuana prior to their actual initial use, the first and last variables (that is to say, the initiate's perception of relative danger and his closeness to his initiator) being the ones most often cited as inhibiting factors. In this regard, 'trust' in the person(s) offering the drug is often reported as a major factor in the decision to try cannabis.^{23,80}

First use, when it does occur, is almost always a social event (usually involving close friends who are experienced users) and generally takes place on weekends or in the evenings in a residential location. According to the Sir George Williams University survey, nearly two-thirds of the cannabis-using students reported that they "felt no different than at any other time" on the occasion of their initial use, while only 17% reported any familial or personal problems or feelings of depression or unusual boredom at that time.¹⁰ This initiation process is often viewed as a highly significant event in the lives of those who become regular users. It is, as Goode suggests:

...a kind of milestone, a *rite de passage*; it is often seen as a part of "growing up" for many adolescents....Its importance in one's life is overshadowed only by (and is similar to) losing one's virginity.³¹

Continuation of cannabis use beyond the initial stage is dependent on an individual's completion of a normal, but essential, learning process. While cannabis is smoked for pleasure, enjoyment is neither immediate nor automatic. Initially, a certain technique must be mastered so that the desired 'high' can be achieved.^[f] The learning of the correct inhalation procedure (which is usually quite different from cigarette smoking), so as to produce the symptoms of the cannabis 'high', constitutes the first step to becoming an occasional or regular user. Many regular users report that they did not get 'high' during their first few trials but most, if they learn the modes of effective inhalation through personal instruction, popular media presentations,¹⁵ or observation and imitation of other users, will eventually experience the effects of the drug.

Since these effects are very rarely self-evident, the perception of them as the 'high' is a second step in this conversion process. So not only must a new user learn how to correctly administer the drug, but he must also learn, generally through participation with more experienced users who help him to such a perception, to recognize the effects of the drug and relate them to his use of cannabis.

Continuation, beyond the experimental stage, is dependent on one further

condition, a third step. Since cannabis smoking may not be inherently pleasurable, the novice user must usually learn to enjoy the effects he has come to recognize as cannabis-induced. Such learning is the result of early cannabis 'highs' being interpreted as pleasurable, according to group definitions. Since the naive user may initially perceive the drug's effects as frightening or at least ambiguous, a redefinition of the sensations as pleasurable is a necessary condition for continued use by these persons. This redefinition usually occurs through interaction with more experienced smokers who minimize the seriousness of unpleasant feelings, assure the novice of their ephemeral nature, and direct his attention to the more immediately pleasurable effects. As Becker has noted, "[t]he taste for such experience is a socially acquired one, not different in kind from acquired tastes for oysters or dry martinis."¹¹

Assuming its availability, becoming a cannabis user thus depends on a willingness to try the drug, learning how to smoke so as to produce the desired sensations (the 'high'), learning to recognize the 'high', and learning to enjoy these effects and to define them as pleasurable. This procedure is essentially the same as any normal learning process through association with others and, given availability of the drug, "it becomes apparent", as Matza has observed, "that *anyone* can become a marijuana user and that *no one* has to."⁵⁸

Many cannabis users do not continue their consumption beyond the beginner's stage. It is difficult to state what proportion of those who experiment with cannabis do not persist in their use of this drug, but several surveys have indicated that between 20 and nearly 50% of those respondents who had ever used cannabis discontinued such use after a few trials.^{10,44,46,71,100} The Commission's own survey research found that just over one-quarter of those university students who had smoked cannabis had stopped use within one academic year, or in less than nine months.⁴⁹ The lack of longitudinal studies of cannabis users, however, makes it impossible to determine whether the abstinence patterns reported in these surveys were permanent or a function of the particular points in time at which the surveys were conducted.

The Sir George Williams University (S.G.W.U.) survey and other investigations have found that the termination of cannabis use at the beginner's stage often appears to be a consequence of not appreciating or learning to appreciate the effects of the drug, being predisposed to resist its effects, or the result of having satisfied a mild curiosity. The S.G.W.U. survey, for example, found that 95% of those who had stopped using cannabis (over 90% of these persons having done so "after only a handful of instances in the duration of a week or two") explained their abstinence by describing the experience as ineffectual or uninteresting.¹⁰ Biernacki and Davis, based on their study of ex-marijuana users in San Francisco, further suggest that beginners may also terminate their use of cannabis as a consequence of perceived effects that are subjectively defined as unpleasant or, in some instances, as a result of the using situation or fellow smokers being viewed negatively.¹⁶

Marijuana or hashish users who have learned to enjoy the 'high' often progress to the occasional user career stage. This stage is characterized by the irregular or chance use of cannabis, the individual's consumption pattern being a function of the drug's availability. When others offer him cannabis he

may smoke it, but he probably does not go out of his way to procure the drug, nor does he attempt to ensure a constant or regular supply (or 'stash') for himself. The need for secrecy, however, may still be a source of some concern; but through participation with other users, an individual, in Becker's words, "...comes to realize that, although it may be true that sanctions would be applied if non-users found out, they need never find out."¹² Prudence, discretion, and an absence of bad luck are usually sufficient to guarantee that the occasional cannabis user will not experience public exposure.

Continued interaction with other cannabis smokers also provides the occasional user with a set of justifications to overcome the influence of conventional morality. Use of the drug is rationalized as relatively innocuous or even beneficial, and his occasional use pattern assures the user that he is in control of the drug.

It is probable that about half of those Canadians who have used cannabis are, or at some time were, occasional users. Some of these terminate their cannabis use at this stage, usually as a result of changes in their life-situation or those of their smoking acquaintances (such as marriage or a change in residence or job) rather than as a consequence of any deliberate decision.¹⁶ Others, however, progress to more regular patterns of consumption. These persons, because of their systematic and regular smoking patterns, require a more stable source of supply than users dependent on chance developments. Procuring such a supply ordinarily assumes the purchase of marijuana or hashish from a 'dealer'. At one time such purchases required direct involvement in a cannabis-using group through which one could gain an introduction to dealers, having established oneself as trustworthy. While such considerations are no longer as important in securing a cannabis supply, it remains true that most regular users associate primarily with other users and are at least peripherally involved in a drug-using scene.

Whereas secrecy may have been almost a necessity to regular cannabis users as recently as five years ago, for many today public exposure is no longer a major source of anxiety. The fear of arrest still exists for some regular hashish and marijuana smokers, but in most Canadian cities illicit drug users believe that the attention of the police is primarily directed towards traffickers and users of more socially disapproved drugs such as heroin and LSD. Consequently, many cannabis users, despite the fact that they present themselves as such, feel relatively safe, although they continue to exercise caution in regard to their locations of actual use.

Most regular users, however, particularly those who live with their parents or have conventional jobs, are probably anxious about being publicly identified as cannabis users. Concealment of their use, not only from the police but from anyone else who may censure them, is a matter of continual concern. The risk of such disclosure is most often controlled through the compartmentalization of the user's daily activities so that cannabis use is reserved for those settings where potentially disapproving non-users are unlikely to intrude. Consequently, the more routine and frequent an individual's cannabis use, the more he is likely to reduce his social contacts with non-users. Since such interaction, however, can rarely be eliminated totally, the regular user will have to develop additional protective techniques, beyond avoidance, if he

is to continue this style of use. Becker, in discussing one mode of resolving this dilemma, suggests that the user learns:

...to control the drug's effects while in the company of non-users, so that they can be fooled and the secret successfully kept even though one continues participation with them....

The typical experience is one in which the user finds himself in a position where he must do something while he is high that he is quite sure he cannot do in that condition. To his surprise, he finds he can do it and can hide from others the fact that he is under the drug's influence.¹²

Regular consumption of cannabis may lead to some anxiety in the user regarding the possibility that he is dependent on the drug or that his continual use of it interferes with his routine obligations or activities. For a very small minority of regular users these concerns are sufficient to lead to a decrease or termination of cannabis consumption. Most users, however, either abstain for a few days to test their possible dependence on the drug or satisfy themselves from personal experience that their use of the drug does not produce effects to which they object. In those situations where adverse effects do occur, users appear to either deliberately control future consumption or view their cannabis-related activities as more important or meaningful than those displaced by such use.

Goode suggests that, "[w]e may take it as an axiom that everywhere and at all times, marijuana is smoked in order to attain the high."³¹ While this is certainly true, regular users' rationales for their continued consumption of marijuana or hashish are somewhat more complex. Besides the production of the 'high', the most frequently mentioned reasons for continued use are the attaining of pleasure or an improved mood; the relief of tension and depression or as an adjunct to relaxation; heightened awareness, perception, or sensitivity; increased sociability or fellowship; and to assist in introspective or reflective pursuits.^{23,38,61,65,67}

Continued, regular consumption of marijuana or hashish, as is the case with experimental and occasional use, depends on a favourable interpretation of the cannabis-induced 'high'. Some experienced cannabis users have suffered acute anxiety or depression reactions to cannabis smoking, usually as a consequence of ingesting more cannabis than they ordinarily use or as a result of using cannabis that is more potent than they anticipated. Adverse reactions may also occur, however, as a function of drug mixtures (cannabis and alcohol or some cold pills, for example) or anxiety-producing settings, moods or companions. The user, on such occasion, may decide to exercise more caution in the future (by reducing the amount or frequency of his consumption, or by avoiding those situations or persons likely to precipitate adverse sensations), or he may decide that the experience is no longer capable of producing pleasure. If the latter occurs, the smoker may cease using cannabis permanently or until such time as he redefines the drug as potentially pleasurable once again. Deliberate abstention from use of this drug on the part of regular smokers may also occur as the result of a personal crisis which causes an individual to question his lifestyle and identity as a drug user. If continued consumption is felt to be detrimental to, or in conflict with, his

preferred existence or self-image, his cannabis use may be deliberately arrested.¹⁶

Biernacki and Davis, in discussing the complexities of voluntary abstention from cannabis consumption, suggest that:

...the reasons, conditions and processes of termination appear to be inextricably tied in with the levels and styles of use to which [the user has] put the drug. And, to complicate the equation further, both prior mode of use and manner of termination seem..., in turn, to be intimately related to the general life career pattern of the individual, most especially the range and depth of his commitments and involvements in such other institutional spheres as work, school and family.¹⁶

Continuation of use (given availability of the drug), is for most cannabis smokers, however, contingent on the user being able, in Becker's words, "...to answer 'Yes' to the question: 'Is it fun?'"¹²

LEVELS OF CANNABIS USE

Many investigators of cannabis smoking have attempted to develop categories with which to differentiate users. Some define these classifications in terms of total number of uses of the drug (often within a fixed time period such as six months or a year). Others utilize a set of frequency-per-unit-time criteria, such as times per week or times per month. Still others define categories by means of descriptive adjectives, with highly variable criteria. Thus, the following labels have been employed to describe use patterns of cannabis or cannabis and other drugs: occasional, casual, light, experimental, intensive, recreational, taster, once, non-continued use, irregular, first use, infrequent, beginner, limited, moderate, regular, habitual, frequent, heavy, light-moderate, moderate-heavy, interstitial, psychedelic subcultural, professional pothead, frequent intensive, seldom, often, early use, head, addictive, moderate-mixed drug, extreme, seekers, fairly heavy, continuing heavy, prolonged heavy, regular heavy, and chronic. Some studies, in fact, do not specify criteria and others distinguish between users on the basis of such factors as subcultural involvement, availability of a source, meaning of the experience, and combinations of drugs used.

Terminological diversity of this nature renders it very difficult to compare the findings of various studies. Some user distinctions, however, are required since the meaning or significance of the phenomenon for any individual is closely associated with both the social context of his cannabis use and the frequency with which he uses the drug. For these reasons, in this section we set out a typology of cannabis users based, primarily, on frequency and regularity of consumption. It should be recognized, however, that frequency and regularity of use are continuous rather than discrete variables, and that the levels-of-use categories are arbitrarily constructed for purposes of analysis.

Cannabis smokers who have learned to recognize the 'high' and to experience it as a state sufficiently desirable to warrant continued use of the drug,

(in other words, post-experimental users), may be divided into three categories. These categories are related to the post-beginner stages of the cannabis career described earlier and, as such, can be conceived of as identifiable gradations of increasing personal involvement with drugs and drug-related activities. There is no reason to believe, however, that a marijuana or hashish user remains permanently tied to any particular level of use.

The first level of continued consumption can be called occasional use. The pattern of use, in this case, is episodic and fortuitous, the individual's consumption being dependent on chance developments (usually invitations to share others' marijuana or hashish) since he does not ensure control of drug supplies in order to establish a regular consumption pattern. Although the occasional user maintains an interest in or, at least, an openness to cannabis use, his marginal status with reference to drug-using groups and his failure (or inability) to ensure a relatively regular, personal supply severely limit his involvement with the world of drugs. Cannabis, for the occasional user, is a pleasant diversion, but its use is not deliberately pursued as it is of little importance in his life.

Although there are marked variations in the frequency criteria employed by different surveys, for comparative purposes occasional users are here defined as those who consume marijuana or hashish once a month or less. More cannabis smokers surveyed by the Commission fell into this category of use than any other. Twenty-nine per cent of Canadian cannabis-using secondary school students, 39% of the cannabis-using university students and 46% of those cannabis users interviewed in the national household survey can be defined as occasional users.^{48,49,47} Some of these persons, of course, are not stabilized occasional users. But what proportions will discontinue cannabis use or progress to increased levels of consumption cannot be ascertained at this time.

The second and third levels of use both involve the regular consumption of cannabis, and both, consequently, depend on the user's establishing a relatively reliable marijuana or hashish source. The first type of these regular smokers can be referred to as moderate-regular users.^[6] Biernacki and Davis, in discussing this style of use, noted that:

The most distinguishing characteristic of this mode is that use is regulated or scheduled so that the perceived effects or after-effects of the drug do not interfere with other activities in which the user is engaged. That is, the [moderate-regular] user finds the use of marijuana pleasurable, but also defines it as incompatible with other investments and commitments emanating from his total life situation ...[Consequently] his use of the drug is typically restricted to leisure settings and hours.¹⁶

These moderate-regular users may limit their consumption to special occasions or may use the drug as frequently as several times a week. For analytical comparisons, however, this category has been defined so as to include all of those persons who regularly use cannabis more than once a month but not more than once a week. According to the Commission's surveys, nearly 29% of the cannabis-using high school students and 22% of those in university are moderate-regular users.^{48,49}

Individuals smoking cannabis at the moderate-regular level generally do so freely and non-compulsively in a recreational context.^{23,31,79,86} With this style of use, persons usually smoke as an aid or adjunct to (rather than replacement of) their participation in or enjoyment of such activities or events as movies, concerts, small parties, sex, music and meals. While such individuals are definitely involved in a drug-using milieu, the use of cannabis itself is not of primary importance, and the drug has a relatively superficial impact on the user's life. Other drugs, particularly the hallucinogens, may be tried (although this is certainly not inevitable), probably as a natural consequence of greater involvement in milieus where such drugs are available and their use accepted.^{23,31,64,79} Such use, if and when it does occur, is likely to be of a moderate, experimental nature.^{23,45}

The third pattern of cannabis consumption is heavy-regular use. This level of use, for our purposes, includes all those who regularly smoke cannabis from twice a week to several times a day. Only 6% of the cannabis-using Canadian high school and university students surveyed by the Commission used the drug as frequently as several times a week, and an additional 1% of the cannabis-using high school students and 3% of the cannabis-using university students claimed to smoke every day.^{48,49}

For heavy-regular users cannabis constitutes a focal, undisguised part of a lifestyle. Marijuana or hashish is smoked casually, without scheduling or ritualization, the drug being incorporated into daily behaviour and experience. For some, smoking may begin upon arising each morning and continue throughout the day,²⁹ but this is a relatively rare style of use. The heavy-regular user, unlike cannabis smokers who indulge less frequently, generally demonstrates little concern with secrecy or concealment.⁸⁰ This is most likely a result of his reduction or elimination of social contacts with conventional society and his nearly complete involvement with other drug users and the illicit drug market in which he is often an active participant.^{12,16,22,31,79}

The exclusive consumption of cannabis on a daily basis is relatively unusual in North America, as individuals who use marijuana or hashish this frequently are ordinarily involved in a pattern of multiple-drug use. Several studies have demonstrated an association between the heavy smoking of cannabis and the occasional use of hallucinogens,^{31,64} and every recent survey of young users of opiates and amphetamines has found almost universal prior (and occasional-continued) use of cannabis substances. While use of these other drugs is, in most cases, temporary or episodic, these heavy-regular cannabis users express a stronger commitment to the continued use of marijuana or hashish than any other category of users.^{64,79} For these individuals cannabis use has become a normal aspect of their everyday life, an integral part of their routine existence.

CANNABIS-USING POPULATIONS

Marijuana and hashish are smoked primarily, although certainly not exclusively, by the young—university and high school students and others in this age bracket no longer attending academic institutions. During the mid-sixties Canadian cannabis use was concentrated on college campuses. Since then, of

course, the practice has widely diffused to high school students and the adult world as well as to 'hippie' or 'street' persons. University students, however, continue to have a higher incidence of use than any other institutional population, and the Commission's survey of this population suggests that the proportion of cannabis smokers in Canadian colleges is still rising.

Suchman suggests that the behavioural and attitudinal differences that he found to exist between university cannabis users and non-users reflect a recent cultural development among North American youth.⁹² For Suchman, marijuana use is seen as only one component of a newly evolving value system which has been termed the "hang-loose ethic". The position was initially advanced by Simmons and Winograd:

One of the fundamental characteristics of the hang-loose ethic is that it is irreverent. It repudiates or at least questions, such cornerstones of conventional society as Christianity, "my country right or wrong", the sanctity of marriage and pre-marital chastity, civil obedience, the accumulation of wealth, the right and even competence of parents, the schools, and the government to head and make decisions for everyone—in sum, the Establishment.⁸⁵

While it remains true that college cannabis users and non-users can be socially differentiated by a number of variables, the extreme differences noted by Suchman apropos of the "hang-loose ethic" are not as likely to be found today as they were at the time of his survey in 1967 because of the rapid spread in use of the drug and acceptance of the ethic since that date.

Apart from some minor variations in the conclusions reached by various investigators of university cannabis users, there has emerged, generally speaking, a consistent portrait of the social characteristics of these students. Dr. Joel Hochman, in testimony delivered to the California State Assembly in March of 1971, summarized his own extensive research while presenting the following description of the differences between cannabis users and non-users on contemporary college campuses:

In summary, our findings, which have since been affirmed by other investigators, largely failed to discriminate users from non-users in their achievement or adaptation....

...we, and others, however, have determined that there have been definable differences between users and non-users of marijuana with regard to their personalities and values. Most simply, users have been more alienated, anti-authoritarian, now-oriented, stimulus seeking, self-critical, dissatisfied and non-traditional than non-users. They have also been more politically active and liberal. Further, they have also been more sexually experienced, far less likely to be living at home, more likely to be living communally or cohabiting without benefit of matrimony. Finally, they have been definitely inclined to experiment with a wide variety of drugs, though no regular pattern of use occurs except the use of marijuana. However, the reason I use the past tense is important. Evidence is rapidly accumulating which indicates that as the use of marijuana has spread, these differences between users and non-users have become less distinct.... Those who began smoking marijuana before 1969 were characterizable as psychologically and philosophically different from the average young citizen. But these differences seem to be fading rapidly, as the drug's use is increasingly absorbed into society. As use has spread, the differences between those who use it and those who don't are likely to become increasingly even less distinct.⁴⁰

The trends suggested in Dr. Hochman's statement are, for the most part, also valid in Canada with reference to both university and high school students. While the college campus was once (and may still be) the main locus of cannabis introductions, as the drug's use has diffused increasing numbers of young persons are being initiated while they are in high school. Unfortunately, there are no Canadian surveys, as yet, of the extent of cannabis use in grade or primary schools. According to the Commission's high school survey, however, it is apparent that apart from British Columbia, where some leveling in the rate of acceleration had occurred in 1970, the incidence of marijuana or hashish use in Canadian high schools has been rising at an accelerating rate for several years.⁴⁸

While most media, social research and law enforcement attention has been focused on the use of drugs by young persons, there is increasing evidence that otherwise conventional North American adults are also smoking marijuana or hashish. Their numbers are certainly increasing (particularly as persons with high school or college cannabis experience mature), and although only 3.4% of those interviewed in the national household survey reported that they had used the drug by April of 1970 this still represents approximately half a million persons.⁴⁷ Unfortunately, however, this sizable population of users has not been investigated as thoroughly as either the high school or college populations; but the accumulated evidence, to this date, does suggest that it is primarily a middle and upper-middle class phenomenon found mainly among those in their twenties and thirties. Generally speaking, it appears that except for age the social characteristics of marijuana or hashish smoking adults are similar to those of cannabis-using students. As in the case of student populations, it is possible that any major distinguishing features between users and non-users will tend to disappear as the proportion of cannabis consumers continues to grow.⁵⁴ Cisin and Manheimer, in concluding their report on their extensive surveys of marijuana use in two California communities, indicate the dangers in attempting to differentiate adult users from non-users by any socio-demographic factors when they note that:

Simplest generalizations about marijuana use in various population groups may be appealing, but at least as far as static analysis can go, there are very few characteristics that, taken alone, consistently predict marijuana use. Certainly, males are more likely than females, the young are more likely than the old, and the unmarried are more likely than the married, to have used marijuana. But the probabilities of use...are subtly affected by specific combinations of these characteristics, whose relative importance varies from one location to another.²⁵

There are some cannabis smokers (of high school, college and adult ages) whose highly mobile lifestyle mitigates against the utilization of random survey modes of analysis. It is for this reason (and because they are geographically concentrated and rarely attend high schools and colleges) that they were generally 'missed' by the sampling techniques employed by the Commission and other general surveys. Consequently these persons (occasionally referred to as 'hippies', 'freaks', or 'street people') have ordinarily been studied through the use of more anthropological techniques which usually involve the employment of participant-observers who carefully record their daily impressions of the group under study and often engage in lengthy semi-structured

interviews with the individuals they are observing. This method of analysis rarely permits the construction of statistical data but, in cases of extensive and thorough investigation, does allow for reliable generalizations about these populations.

It is difficult to capture the diverse elements included in this population with a single phrase or rubric. It appears, however, that the adjective 'street'—which serves to indicate the locus of many of these persons' activities and is a natural, indigenous expression, rather than externally imposed—is the most appropriate means of describing this life style and those who follow it. Some similar groups—communards (persons inhabiting communes, usually rural) and many school drop-outs—may not be 'street people' in the sense in which the term is conventionally employed; but these individuals share many of the basic social characteristics of persons in the street scene (such as a relatively young age and voluntary unemployment or non-traditional employment) and, consequently, will be included in this discussion.

The street, in many ways, is a state of mind connoting freedom, transience, physical mobility, spontaneity, immediacy and day-to-day living.^[h] Physically, it is usually a public or semi-public area (a park, shopping centre, mall, square, tavern or actual thoroughfare) in which 'street people' (as well as others) congregate to meet, talk, make future arrangements and, sometimes, use or exchange drugs. 'Street people' are almost all cannabis smokers (most have had some multiple drug experience), and for some of them (particularly during the summer months) the street is their home or, at least, the address at which they are most likely to be found. Carey, in discussing the role of Telegraph Avenue ('the Avenue') in Berkeley, California for members of the street scene, has noted that:

...the Avenue constitutes their "living room" or, more precisely, a "playroom". For these people, such living arrangements as do exist are quite irregular. They may be sleeping in cars, in laundromats, or in the apartment of someone who has been kind enough to put them up for a while. They view the Avenue, or certain parts of it, much as delinquent youth view their street corners.²³

Because of the lack of any surveys, the constantly changing dimensions of the population, and the necessary imprecision involved in defining who is to be included in this scene, it is extremely difficult to even guess the number of street-people in North America. Yablonsky, in the heyday of the hippie phenomenon, calculated that there were "...about 200,000 core visible and identifiable total hippie drop-outs in the United States".¹⁰² No Canadian estimates are available although the numbers of such persons^[i] has most likely increased in both the United States and Canada since Yablonsky's 1968 estimate. While there are many scenes in any city, the demographic focus of an urban street scene is usually a low-cost housing area or public facility relatively near the city centre. During the summer of 1970, Fourth Avenue and Seventh Avenue ('Chemical Row') in Kitsilano, and Gastown represented the major street scenes in Vancouver,²⁷ while Yorkville has been the Toronto bohemian enclave since the 1950s.⁸⁸ The Winnipeg and Halifax scenes are centred in downtown parks, Memorial and Victoria respectively, while Ottawa street people tend to congregate in the very centre of the city along a public shopping mall and the grounds of the National Arts Centre.

The Montreal scenes are linguistically and culturally divided. French-speaking 'street people' are most readily observable in Carré St. Louis and Old Montreal, while younger users (many of whom live with their parents and whose attachment to the street would terminate or be severely curtailed with the re-opening of schools in September) tend to congregate at La Ronde (the amusement site at Man and His World, formerly Expo '67).⁵⁰ English-speaking individuals are more likely to be found in the downtown Milton-Park area (known as the 'Ghetto') just east of McGill University⁵⁷ and in the area immediately adjacent to Sir George Williams University. During the winter months, when public parks are less accessible and the size of the transient population diminishes, these scenes move indoors as coffee houses and taverns tend to replace the outdoor sites as foci of fraternization.

'Street people' may range in age from thirteen or fourteen (during the summer months) to the mid-thirties or even older, but most are between eighteen and twenty-four years old with the average age for males being about twenty-one and, perhaps, slightly younger for females. There are about two males to every female although in some scenes ('greasers' and 'bikers', for example) males are even more over-represented. Most of these persons have at least temporarily separated from their families. In many cases there are histories of parental alcoholism or broken homes, and their pre-street home life is often viewed by them as an unhappy, authoritarian and stifling environment. (In one British Columbia study, however, high school drop-outs were found to have more frequently discussed such subjects as choice of friends, dating, sex, birth control and drugs with their parents than those persons who were still in school.⁷⁷) Somewhat related is the fact that most street people are either areligious or have renounced their parents' religion and substituted, instead, an interest in Eastern or esoteric religions or philosophies. Smart and Jackson, in their discussion of the hippies in Toronto's Yorkville in 1967-68, have observed that:

Yorkville hippies are interested in oriental religions, but what passes for sophistication in this area is extremely superficial knowledge....The Yorkville religious practices are mostly displays of ritual with little theological content....In fact, hippies seem taken with any religion or interest which is exotic and in contrast with the mores of western society. These exotic interests include: witchcraft, hypnotism, astrology, and numerology.⁸⁸

Except for a few successful drug dealers, 'street people' tend to be voluntarily, if temporarily, impoverished. But various studies of these persons have found that the majority come from middle-class homes and have at least finished high school.^{5,69,82,88,95,98,102} These reports, however, probably reflect the dates at which this research was conducted (between 1967 and 1969), as recent Commission field studies carried out in major cities across Canada suggest that as the hippie ethos has attenuated in importance, increasing numbers of more poorly educated persons from working class backgrounds have been attracted to the street.³³

During the summer street people's ranks are swelled by students, but those who remain once school re-opens are ordinarily unemployed (and often survive on welfare) or engaged in primarily menial or craft-related tasks (on a full or part-time basis) for small remuneration. Some are involved in

trafficking (either to finance their own drug purchases, to supplement their welfare payments, or as a career) or panhandling, and a few are petty criminals (mainly theft) or prostitutes. Their relatively poor financial condition is manifested in their living arrangements. Most reside semi-communally in well-worn houses or individually in cheap hotels or private rooms. During the summer it is often possible to sleep out-of-doors or at various youth hostels. During the winter months, however, without these alternatives, homeless street persons are forced to 'crash' (seek temporary residence) at the homes of friends who may only be able to afford an unpaying guest for a brief period of time.

Almost all 'street people' are cannabis users. Their consumption is primarily controlled by availability and their financial resources. It is within these scenes that individuals who are 'high' most of their waking day are most likely to be found, although, even here, they represent only a very small proportion of the total population. Nevertheless, the daily smoking of marijuana or hashish is more the rule than the exception. Cannabis use is more routinized and less ritualistic among 'street people' than among any other marijuana- or hashish-smoking populations. The use of cannabis is so commonplace that few, if any, mystical or special properties are attributed to the act, and it is not unusual for street persons to smoke alone or in public areas such as streets or parks. The incidence of use of other illicit drugs is also higher among these people than among any other cannabis smokers. Most observers report that more than half of their subjects have at least tried hallucinogens (many had used these drugs frequently), and there are relatively high rates of experimental use of amphetamines and opiate narcotics.^{82,91,101,102}

Many 'speed freaks' and young heroin users are recruited from these multi-drug-using scenes. There is almost universal consumption of tobacco and most drink alcohol (usually beer or wine), although rarely to excess. During the summer of 1971, however, alcoholic beverages became very popular among 'street people'. Whether this reflects the recent lowering of the legal drinking age in some provinces, a paucity of potent and inexpensive cannabis, an ephemeral fad, or the recent re-discovery of a licit 'turn on' is not yet known.

Shorn of its hippie 'virtuousness', the street scene has apparently become less attractive to middle class youths. Yet it continues to grow as facilities (such as free clinics, hostels, drop-in centres and community newspapers) develop to serve its needs and as increasing numbers of young persons choose to exchange what they perceive to be their suffocating familial situations for the insecurity but independence of the street. Very few, if any, of these individuals are cannabis-naïve when they leave home, but their newly adopted lifestyle reinforces such use (and at least tolerates the use of other drugs) so that marijuana or hashish consumption often becomes a daily institution.

In these last pages we have been concerned with cannabis use among the so-called 'street people'. The patterns of use in this population are, of course, extremely important. As we point out it is in this context that the drug has its most intensive use. However, this is also a population largely made up of

multi-drug users. It must be stressed that, important as this population is, it is only a minority of those who use cannabis. Most users do not move to the 'street' and do not reach the levels of use found there. Rather they use marijuana or hashish in a fashion that is increasingly similar to the way in which they use alcohol.

COMMISSION SURVEY DATA

In the spring of 1970, the Commission conducted three national surveys of drug use in Canada. These were carried out on the Commission's behalf by the Survey Research Centre of York University in collaboration with le Centre de Sondage de l'Université de Montréal. Three populations were surveyed—high school students, university and college students and the rest of the national population. The samples of these populations were as follows:

- (1) High school students from the ages of 12 to 19 years, enrolled in grades 7 to 12 or 13. These students were interviewed in homes selected for the National Household Survey, described in (3) below. More than 1,200 students were interviewed in this survey.
- (2) A total of 1,213 students attending colleges and universities in Canada at either the undergraduate or graduate level. Each student selected for this survey was provided with a letter explaining the study, a copy of the questionnaire and material for return mailing. The students selected were from 8 large and 12 smaller institutions representing all regions of the country.
- (3) Some 2,800 households, in which an individual in each household was interviewed under a method of selection that ensured an equal opportunity to be interviewed for each member of the household 12 years of age or older who was not attending a primary or secondary school.

The data derived from these surveys—the first and only systematic national surveys in Canada of drug use by these populations—require further analysis before they can be reported in detail. This analysis will be presented in a subsequent report (as will a review of some other surveys of drug use in Canada). However, at this time the essential conclusions regarding the extent of use are summarized in what follows.

Our data indicate that there has been a rapid and very sharp increase in the use of cannabis in Canada within the past five years. According to our surveys, an estimated 79,000 persons had begun using cannabis in 1966 or earlier. By 1970, an estimated 850,000 persons had used it at least once. Projecting to mid-1971, an estimate of between 1,300,000 and 1,500,000 persons who have used cannabis is not unreasonable. Obviously, these estimates do not take into account the number of individuals who have terminated their use of the drug. This will require further analysis. To understand the social significance of these findings, however, we must not overlook the frequency with which the drug has been used by individuals. Our surveys indicate that a significantly large proportion of those who have used cannabis appear to have used it in an experimental fashion—not more than two or three times. Our continuing analysis of the survey research data will assist in

TABLE 5

CANNABIS USE: ESTIMATES OF PROPORTIONS AND NUMBERS WHO BEGAN USE, WERE USING, HAD EVER USED,
AND HAD APPARENTLY TERMINATED USE, BY YEAR AND SURVEY

Year and Survey	Began Use in—		Were Using at the End of—		Had Ever Used by—		Had Apparently Terminated Use by—		Had Apparently Terminated Use in—	
	Proportion of sample	Estimated number	Proportion of sample	Estimated number	Proportion of sample	Estimated number	Proportion of sample	Estimated number	Proportion of sample	Estimated number
1966 or earlier National (1966)	%	79,000	%	28,000	%	79,000	%	51,000	%	—
1966-67 High School University (1966-67 or earlier)	3.9	11,000	3.5	10,000	3.9	11,000	0.3	1,000	—	—
National (1967)	0.7	90,000	0.6	78,000	1.3	169,000	0.7	91,000	—	—
Total		101,000		88,000		180,000		92,000		—
1967-68 High School (1967-68 University or earlier)	1.9	47,000	1.9	46,000	1.9	47,000	0.04	1,000	—	—
National (1968)	4.8	13,000	7.1	20,000	8.7	24,000	1.4	4,000	1.1	3,000
Total	0.7	83,000	1.0	134,000	2.0	252,000	0.9	118,000	0.2	27,000
		143,000		200,000		323,000		123,000		—
1968-69 High School	2.9	70,000	4.6	110,000	4.8	117,000	0.3	7,000	0.2	6,000
University	8.1	22,000	13.5	37,000	16.8	47,000	3.6	10,000	2.2	6,000
National (1969)	0.8	96,000	1.1	143,000	2.8	348,000	1.6	205,000	0.7	87,000
Total		188,000		290,000		512,000		222,000		99,000
1969-70 High School	5.5	133,000	7.4	180,000	10.3	250,000	2.9	70,000	2.6	63,000
University	12.2	34,000	17.4	48,000	29.0	80,000	11.6	32,000	7.9	22,000
National 1970*	0.6	80,000	1.0	126,000	3.4	428,000	2.4	302,000	0.8	97,000
Total		247,000		354,000		758,000		404,000		182,000

*Data from the first four months of 1970 only.

estimating the proportion of Canadians whose use of cannabis has gone beyond the experimental stage and might be considered occasional or frequent use.

Table 5 presents a composite tabulation of our survey findings with respect to the extent of cannabis use in Canada. It should be noted, however, that the information contained in this table was derived from responses to a question in which the respondents were asked to trace a line showing the level of their cannabis use in each year from 1966 to 1970. However, in examining the questionnaires, we have found a higher rate of response to more simple and direct questions in the questionnaire regarding the use of cannabis. On the basis of these replies, which almost certainly yield more accurate data, we find that in 1970 cannabis use was reported by 11% of the high school students (295,000), 29% of the college and university students (80,000) and 3.6% of the household survey (451,000), giving a total of about 816,000. To this should be added some tens of thousands of 'street people' whom we were unable to reach through our surveys. This would provide an estimated total of between 841,000 and 866,00 individuals who had used cannabis by the spring of 1970.

NOTES

- [a] Becker's original work has recently been further developed by David Matza⁵⁸ and Erich Goode.³¹
- [b] A number of high school surveys have indicated that a high proportion of students have been offered cannabis. One 1969 British Columbia study, for instance, found that nearly one-half of the surveyed students had been offered marijuana,⁷⁸ while nearly two-thirds of those Vancouver high school students surveyed one year later reported being offered the drug.⁶⁶
- [c] The Commission's university survey, for example, found that only 3% of Canadian college cannabis users had first tried the drug by themselves.⁴⁹
- [d] In a survey conducted at a small college in the American Midwest, students were asked to characterize marijuana users in one of six ways. Sixty-seven per cent of the non-cannabis-using students felt that marijuana consumers were "not much different from people who do not use", and an additional 7% considered them "more sensitive and intelligent". Only 3% of the non-users thought marijuana smokers to be "morally degenerate".³⁶
- [e] The Commission's own surveys tend to support this conclusion. When non-cannabis users were asked why they did not use the drug only 14% of the university students, 26% of the high school students and 14% of those interviewed in the national household survey claimed that their abstention was because they considered cannabis use to be morally wrong.^{49,48,47}
- [f] Cannabis can be eaten by itself or in a variety of preparations. While this method of administration is sometimes preferred by non-tobacco smokers, it is relatively rare in North America and is almost never encountered by novice users.
- [g] Both types of regular users are often called 'heads' in the argot of the soft-drug culture.
- [h] The heroin and speed 'street' scenes are excluded from this conceptualization as they will be discussed in a later report of this Commission.
- [i] The term 'hippie' is seldom used today by those involved in drug use.

Chapter 5

The Law

5. The Law

INTRODUCTION

What follows is some background on the law to facilitate appreciation of the legal issues in the policy considerations. An attempt has been made to confine the material, as far as possible, to the issues with respect to cannabis, although some of it necessarily applies to law and law enforcement in connection with other drugs. In a subsequent report there will be a more extended treatment of the law as it applies to the other drugs. In particular, there will be a more detailed discussion of the international conventions and Canadian legislation as they bear on the question of drug classification and the controls over drugs which must be made available for medical purposes. There will also be discussion of the correctional system in the context of the issue of compulsory treatment. It was thought desirable, however, at this time to develop a general constitutional perspective with respect to non-medical drug use, including the issue of jurisdiction with respect to compulsory treatment.

THE INTERNATIONAL FRAMEWORK

Canada is presently obliged by the *Single Convention on Narcotic Drugs, 1961*,¹ to limit the production, distribution and use of certain forms of cannabis to medical and scientific purposes. The Convention applies to "cannabis", which is defined as "the flowering or fruiting tops of the cannabis plant (excluding the seeds and leaves when not accompanied by the tops) from which the resin has not been extracted"; to "cannabis resin", or hashish; and to the "cannabis plant". It also applies to extracts and tinctures of cannabis, but not to THC, which is covered by the *Convention on Psychotropic Substances, 1971*. Canada is not yet bound by this Convention.²

It is generally considered that the above definition of "cannabis" in the Convention would permit the legalization of a form of marijuana which consisted of the leaves of the cannabis plant and did not contain any of the flowering or fruiting tops. It should be observed, however, that in an article which deals with the cultivation of the cannabis plant for purposes permitted by the Convention, it is provided that "The parties shall adopt such measures as may be necessary to prevent the misuse of, and illicit traffic in, the leaves of the cannabis plant."³ It is not too clear what meaning and scope should be attributed to this provision. There would appear to be some ambivalence in the Convention concerning marijuana which consists of the leaves alone. On the one hand, the parties do not appear to be required to make the production, distribution and use of the leaves alone for non-medical and non-scientific purposes a punishable offence; on the other hand, they are asked, presumably to the extent that they permit cultivation of the cannabis plant for medical, scientific or industrial purposes, to prevent diversion of the leaves to purposes other than those permitted by the Convention.

Cannabis (marijuana) and cannabis resin (hashish) are not only included in Schedule I of the Convention, to which the general control measures apply, but they are also included, together with heroin, in Schedule IV, by which the parties are invited (although not obliged) to apply even stricter controls, including prohibition for medical purposes.

The control measures which are called for by the *Single Convention* are annual estimates by the parties of their requirements of drugs for medical and scientific purposes, annual returns to establish that their use of prohibited drugs has not exceeded the estimated requirements, licensing of import and exports, manufacture, and internal distribution (unless carried out by a state enterprise), and penal prohibitions of conduct related to unlawful distribution and use.

Article 36, paragraph 1, requires certain kinds of conduct to be made punishable offences as follows:

1. Subject to its constitutional limitations, each Party shall adopt such measures as will ensure that the cultivation, production, manufacture, extraction, preparation, possession, offering, offering for sale, distribution, purchase, sale, delivery on any terms whatsoever, brokerage, dispatch, dispatch in transit, transport, importation and exportation of drugs contrary to the provisions of this Convention, and any other action which in the opinion of such Party may be contrary to the provisions of this Convention, shall be punishable offences when committed intentionally, and that serious offences shall be liable to adequate punishment particularly by imprisonment or other penalties of deprivation of liberty.

Thus, as long as Canada is a party to the *Single Convention*, it is obliged to make the above conduct with respect to cannabis, cannabis resin, and extracts and tinctures of cannabis, a punishable offence.

It has generally been assumed that "possession" in article 36 includes possession for use as well as possession for the purpose of trafficking. This is a reasonable inference from the terms of article 4, which obliges the parties "to limit exclusively to medical and scientific purposes the production, manufacture, export, import, distribution of, trade in, use and possession of drugs." There is also article 33, which provides that "The Parties shall not permit the possession of drugs except under legal authority." On the other hand, one may take measures which will have the effect of restricting use to medical and scientific purposes without necessarily making use or simple possession for other purposes a penal offence. (This is the present policy in Canada with respect to the controlled drugs [amphetamines and barbiturates]; the drugs can only be obtained upon prescription, but their unauthorized possession is not a criminal offence.) It is to be noted that the word "use" appears in article 4 of the *Single Convention* but not in article 36. Moreover, the word "possession" appears in a context of distribution rather than one of use, and this is possibly reinforced by the sense of the French version—*détention*. On the face of article 36 it would not be unreasonable to argue that what is contemplated is possession for the purpose of trafficking rather than possession for use, and that the requirements of the article are satisfied if the former kind of possession is made a penal offence. The prevailing view, however, is that the word "possession" in article 36 includes simple possession for use.

On becoming parties to the Convention states were permitted to make a transitional reservation for the use of cannabis, cannabis resin and extracts and tinctures of cannabis for non-medical purposes if such practices were traditional in their territories.⁴ In such cases the use of cannabis must be abolished, within twenty-five years from the date the Convention came into force, namely from December 13, 1964.

As long as a state remains a party to the Convention, it is bound by its provisions, but the Convention provides for amendment and withdrawal.

Any party may propose an amendment. The text of the amendment and the reasons for it must be communicated to the Secretary-General who, in turn, communicates them to the parties and to the Economic and Social Council. The Council may decide either to call a conference in accordance with the Charter of the United Nations to consider the proposed amendment or to ask the parties whether they accept the amendment, inviting them to submit any comments on it. If the latter course is adopted, and the proposed amendment has not been rejected by any party within eighteen months after it has been circulated, it shall thereupon enter into force. If it is rejected by any party, the Council may decide, as a result of comments received from the parties, whether a conference should be called to consider the amendment.

The Convention expressly provides that a party may withdraw from it by the procedure known as denunciation. This is carried out by depositing an instrument in writing with the Secretary-General. The denunciation, if received by the Secretary-General on or before the first day of July in any year, shall take effect on the first day of January in the succeeding year, and if received after the first day of July, shall take effect as if it had been received on or before the first of July in the succeeding year.

As indicated above, the various forms of cannabis now fall under two different international classifications for control purposes. Marijuana and hashish, as well as extracts and tinctures of cannabis, are classified with the opiate narcotics, including heroin, in the *Single Convention on Narcotic Drugs, 1961*, whereas THC and its isomers are classified with the hallucinogens, including LSD, in Schedule I of the *Convention on Psychotropic Substances, 1971*. Presumably, there will be a movement eventually to bring all forms of cannabis under a single international control instrument. In fact, however, the control regime which is reserved for the substances in Schedule I of the *Convention on Psychotropic Substances, 1971*, is comparable in strictness to that which applies under the *Single Convention*. Parties are required, with respect to Schedule I substances, including THC, to "prohibit all use except for scientific and very limited medical purposes by duly authorized persons, in medical or scientific establishments which are directly under the control of their Governments or specifically approved by them...."⁵ Manufacture, distribution and possession of Schedule I substances for such purposes are to be subject to strict controls.

The obligations of the parties with respect to the creation of penal offences affecting the drugs covered by the Convention are set out in article 22 as follows:

1. (a) Subject to its constitutional limitations, each Party shall treat as a punishable offence, when committed intentionally, any action contrary to a law or regulation adopted in pursuance of its obligations under this Convention, and shall ensure that serious offences shall be liable to adequate punishment, particularly by imprisonment or other penalty of deprivation of liberty.
- (b) Notwithstanding the preceding sub-paragraph, when abusers of psychotropic substances have committed such offences, the Parties may provide, either as an alternative to conviction or punishment or in addition to punishment, that such abusers undergo measures of treatment, education, after-care, rehabilitation and social reintegration in conformity with paragraph 1 of article 20.

Paragraph 1 of article 20 reads as follows:

1. The Parties shall take all practicable measures for the prevention of abuse of psychotropic substances and for the early identification, treatment, education, after-care, rehabilitation and social reintegration of the persons involved, and shall co-ordinate their efforts to these ends.

Article 22 of the *Convention on Psychotropic Substances*, 1971, does not indicate the specific kinds of conduct which must be made punishable offences, as does article 36 of the *Single Convention*. Instead, it refers generally to any action contrary to such laws and regulations as the parties see fit to adopt in fulfilment of their obligations under the Convention. This would appear to offer more flexibility as to the choice of conduct which must be made a punishable offence. On the other hand, there is with respect to Schedule I drugs, including THC, an explicit obligation to prohibit the use of such drugs for non-medical and non-scientific purposes, and this would appear necessarily to involve making such use, or at least simple possession for purposes of such use, a punishable offence. This is not the case with the drugs in Schedule II (which includes the amphetamines and drugs with amphetamine-like action), Schedule III (short-acting barbiturates and drugs with similar action) and Schedule IV (other hypnotics and tranquilizers). A party is required to limit, "by such measures as it considers appropriate", the manufacture, distribution and "use and possession" of these drugs to medical and scientific purposes. Such drugs are to be made available only upon prescription but there does not appear to be an obligation to make use or simple possession of such drugs for unauthorized purposes a punishable offence.

The *Convention on Psychotropic Substances* contains the same provisions respecting amendment and denunciation as the *Single Convention*.

Article 32 of the Convention is important as indicating the extent to which a state may become a party with reservations or qualifications concerning particular provisions. Reservations may be made with respect to certain specified provisions without the consent of the other parties. A state may make reservations with respect to other provisions of the Convention at the time of signing if such reservations are not objected to by at least one-third of the parties to the Convention within 12 months after they have received notice of such reservations from the Secretary-General. If less than one-third of the parties have objected, the reservations are deemed to be permitted, but

the parties who have objected need not assume towards the reserving state any legal obligation under the Convention which is affected by the reservations.

THE CONSTITUTIONAL FRAMEWORK

THE CRIMINAL LAW BASIS OF FEDERAL LEGISLATION

Federal drug legislation is presently based upon the criminal law power.⁶ The protection of health from injurious substances and the prevention of adulteration, both as a threat to health and a species of fraud, have been held to be valid criminal law purposes.⁷ Both the *Narcotic Control Act*⁸ and the *Food and Drugs Act*⁹ create criminal offences. There is no essential difference between them in this respect. The maximum penalties for offences under the *Food and Drugs Act* are less severe than those under the *Narcotic Control Act*, and there is a greater opportunity to proceed by summary conviction rather than indictment but the effect of conviction under the two statutes is the same. There was a misapprehension in the course of our inquiry that conviction under the *Food and Drugs Act* was somehow not as serious as conviction under the *Narcotic Control Act*. This impression may have resulted from the fact that the *Food and Drugs Act* appears to be more of a regulatory than a criminal law statute. It regulates a whole range of food and drugs by a system of standards, inspection, and, in some cases, licensing. At the same time, however, it prohibits unauthorized distribution and possession of certain substances with penal consequences. The same is essentially true of the *Narcotic Control Act*. Both statutes are cast mainly in the form of prohibitions—no doubt to emphasize their criminal law character—and the licensing regulations made under them indicate the scope and conditions of permitted conduct. In effect, the regulations complete the definition of the conduct that is prohibited.

There is no doubt that federal penal offences vary considerably in their relative seriousness, and the stigma which will attach to conviction in any case will depend on the nature of the offence and the law under which it arises. Apart from its independent power to create criminal offences, the Parliament of Canada has a regulatory jurisdiction in many areas in which it may create penal offences to enforce its legislation. In many cases these penal offences will be viewed as of relatively much less seriousness than the ordinary criminal law offence. In many cases there may not be a requirement of *mens rea* or criminal intent as a condition of liability.

Thus, for example, it was held by the Supreme Court of Canada in *The Queen v. Pierce Fisheries Limited*¹⁰ that *mens rea* or guilty knowledge was not an essential ingredient of the offence of being in possession of short lobsters contrary to the *Lobster Fishery Regulations* under the federal *Fisheries Act*. It was held that the common law presumption that *mens rea* is an essential ingredient of a criminal offence only applies to “cases that are criminal in the true sense”, and that this was not such a case. Ritchie J., speaking for the majority of the Court said:

I do not think that a new crime was added to our criminal law by making

regulations which prohibit persons from having undersized lobsters in their possession, nor do I think that the stigma of having been convicted of a criminal offence would attach to a person found to have been in breach of these regulations. The case of *Beaver v. The Queen*, *supra*, affords an example of provisions of a federal statute other than the *Criminal Code* which were found to have created a truly criminal offence, but in the present case, to paraphrase the language used by the majority of this Court in the *Beaver* case I can discern little similarity between a statute designed, by forbidding the possession of undersized lobsters to protect the lobster industry, and a statute making it a serious crime to possess or deal in narcotics.

This distinction between offences which are truly criminal and those which are not has been drawn for the purpose of determining whether *mens rea* should be a requirement of liability. This is a matter which goes to the protection of the accused rather than the effect of conviction, although the absence of a requirement of *mens rea* may certainly be reflected in the stigma which attaches to conviction. In any event, the offences under the *Narcotic Control Act* which apply to cannabis as well as the opiate narcotics are clearly criminal offences "in the true sense", and knowledge that one is in possession of a prohibited drug is essential for the offence of simple possession. Similarly, the offences of trafficking, possession for the purpose of trafficking, and simple possession under Parts III and IV of the *Food and Drugs Act* with respect to controlled drugs and restricted drugs are "truly criminal" offences. There is no doubt that the general approach of the legislation and law enforcement towards a particular offence, and especially the relative seriousness of the penalties imposed, will, together with public attitudes, determine the degree of stigma resulting from conviction. But if a person who was convicted of simple possession of cannabis were asked if he had been convicted of a criminal offence he would have to answer yes. The same is true of conviction of simple possession of LSD under Part IV of the *Food and Drugs Act*.

OTHER POSSIBLE BASES OF FEDERAL JURISDICTION IN RELATION TO NON-MEDICAL DRUG USE

There is a question as to whether the federal government has any constitutional basis, other than the criminal law power, for a comprehensive regulation of non-medical drug use. The question becomes one of some practical interest in connection with any proposal to replace the criminal law prohibition of cannabis by a regulatory system that would make it legally available under license or through a government monopoly of distribution. Two possible alternative bases of jurisdiction have to be considered: The trade and commerce power¹¹ and the general power, or "peace, order and good government" clause.¹²

The federal government has had to rely on its criminal law power as the basis of its food and drug legislation because of the limited nature of its power to regulate trade and commerce. The trade and commerce power would at first sight seem to be the logical basis for a licensing system to regulate the distribution and use of drugs which have to be made legally available for medical or non-medical purposes. But this power has been restricted by

judicial decision to interprovincial and international trade and commerce.¹³ Transactions which take place wholly within a province fall, as a general rule, under provincial jurisdiction. Exceptionally, the federal government may regulate intraprovincial transactions if such regulation is necessarily incidental to the effective regulation of extraprovincial trade and commerce. The case that would have to be made for a comprehensive federal drug regulation based on the trade and commerce power would be that Parliament cannot effectively regulate the extraprovincial trade in drugs without controlling intraprovincial transactions as well, or that the trade in drugs must be considered as a whole to be interprovincial and international in character. It is highly unlikely that this would be accepted by the courts. The regulation of local transactions at retail is not necessary to the regulation of the trade in its extraprovincial aspects, as the regulation of certain local operations, such as delivery of grain to elevators for intraprovincial consumption, has been held to be necessary to the effective regulation of the extraprovincial grain trade.¹⁴

The other possible basis for the federal jurisdiction to regulate the use of drugs is the general power. A matter falls within the general power if it does not fall within provincial jurisdiction or within the specific heads of federal jurisdiction. It has also been held that a matter originally under provincial jurisdiction may acquire such national importance as to bring it under the general power. There have been several examples of the first application of the general power, but virtually none of the second outside of a state of national emergency. In the first category are such matters as aeronautics,¹⁵ radio,¹⁶ atomic energy¹⁷ and the national capital development.¹⁸ They are not considered to be matters which at one time were under provincial jurisdiction but subsequently changed in relative importance; they are deemed to have always been matters of national concern. In the second category are the cases holding wartime emergency legislation to be valid on the basis of the general power.¹⁹ Such legislation clearly dealt with matters normally within provincial jurisdiction, such as the fixing of prices and wages. Attempts in peacetime, in some cases in a period of economic depression, to justify federal legislation on the basis of the general power in such fields as labour relations,²⁰ industrial standards,²¹ marketing²² and restraint of trade,²³ have all failed. The regulation of these matters within the provinces, in a non-criminal law aspect, was held to fall within provincial jurisdiction with respect to property and civil rights. They were held not to be matters of national importance for purposes of the general power. In deciding the cases the courts applied what has come to be known as the "emergency doctrine" of the general power—that it can be applied to matters normally of provincial jurisdiction only to meet some emergency. Examples suggested have been war (or similar national emergency, such as insurrection) and pestilence. Economic depression has not been considered a sufficient emergency.

In two leading cases the federal Parliament was held to have jurisdiction, in virtue of the general power, to suppress the traffic in liquor, and it was suggested that it would have the same power with respect to the drug traffic, but a closer examination of these cases, and other related decisions, leads to the conclusion that all that was contemplated in effect was a criminal law exercise of the general power. In the first of these cases—*Russell v. The Queen*²⁴—the Privy Council held a federal liquor prohibition statute to be

valid on the basis of the general power but the language clearly indicates that they saw it essentially as a measure of criminal law. Indeed, the criminal law power was sufficient to support the legislation, and it was unnecessary to invoke the general power in other than its criminal law aspect. The essence of the federal statute was the prohibition of conduct with penal consequences. Speaking of laws having a criminal law purpose, the Privy Council said:

Laws of this nature designed for the promotion of public order, safety or morals, and which subject those who contravene them to criminal procedure and punishment, belong to the subject of public wrongs rather than to that of civil rights. They are of a nature which fall within the general authority of Parliament to make laws for the order and good government of Canada, and have direct relation to criminal law, which is one of the enumerated classes of subjects assigned exclusively to the Parliament of Canada.

This was the way in which the relationship between the specific heads of federal jurisdiction and the general power was originally conceived: the specific heads were thought of merely as examples or aspects of the general power. What seems to have happened in the *Russell* case is that counsel who challenged the validity of the federal legislation conceded that if the matter to which it related did not fall under provincial jurisdiction then it could be deemed to fall under the general power of Parliament. Having found that it did not fall under provincial jurisdiction, the Privy Council did not concern itself particularly with the specific head of federal jurisdiction to which it should be related.

In the *Canada Temperance Federation* case,²⁵ some sixty-four years later, the Privy Council reaffirmed the general power as the basis for the *Canada Temperance Act*, and cited the suppression of the drug traffic as a matter for which Parliament could probably invoke the general power, but the whole history of judicial decisions on the subject raises a very serious doubt as to whether it is the general power in other than a criminal law aspect that can be relied upon. The issue is not whether the drug traffic can be prohibited with penal consequences like the liquor traffic. Obviously it can. The issue is whether there is a more comprehensive basis of federal jurisdiction for legislating in relation to non-medical drug use than the criminal law power—one that would support the full range of legislative options. When we speak of the general power we think of the full scope of legislative power which Parliament considers to be necessary to effect its purposes, such as that which it has been held to possess in time of war or other national emergency. The real issue is whether Parliament has the constitutional basis for the introduction of legislative controls for which the criminal law power cannot be invoked.

Within a few years of the *Russell* case the Privy Council rendered two decisions concerning jurisdiction to regulate the sale of liquor by a system of licensing. In *Hodge v. The Queen*²⁶ they held that the provinces had the power to introduce such a system of regulation, and two years later in the unreported *McCarthy Act* decision²⁷ they held that the federal Parliament did not. The implications of this second decision are that Parliament does not have a true general power with respect to liquor legislation. The *McCarthy Act* provided for a licensing system to operate in municipalities according to local

option. Subsequent judicial references to the *McCarthy Act* decision have indicated that the Privy Council's reason for judgement was that the federal act was considered to be an attempt to regulate trade and commerce within the provinces.

The *McCarthy Act* clearly showed a concern with restrictions on availability in the form of limitations on the number of licenses, and on days, hours and places of sale and consumption. It also contained prohibitions against sale to minors and against adulteration. And, of course, it prohibited all unauthorized sale. It is difficult to see why it could not have been supported on the same basis as that on which federal legislation to control the quality and availability of harmful substances rests today. There would seem to be a contradiction between upholding federal liquor prohibition in the *Russell* case, on the ground of a general power to suppress the distribution of an injurious substance, and denying a similar power in the *McCarthy Act* decision to control the availability of this substance by a system of licensing. The *McCarthy Act* seems to have been regarded, not as an alternative system of controlling an injurious substance, but as an ordinary regulation of trade and commerce within the provinces. It may be that the Privy Council had regarded the "evil" of the liquor traffic in the *Russell* case, not so much as a matter of danger to health as a matter of morality. In any event, the impression is that the Privy Council's perception of the liquor problem had changed radically in the intervening years. There are two explanations which suggest themselves: first, they had previously had to consider a provincial liquor licensing scheme in the *Hodge* case, and having affirmed this, they could not see how they could reasonably recognize a comparable federal jurisdiction; and secondly, because of the somewhat vague reference to the general power in the *Russell* case (which, as we have suggested, was not a true general power at all), they had not really focused on the full implications of the criminal law power as a general basis for federal control of dangerous substances, including control by licensing. The fact is that the federal criminal law power was not properly considered in the liquor cases, either as a basis for federal regulatory legislation or as an obstacle to provincial liquor prohibition. (Among the early decisions was one affirming provincial jurisdiction to prohibit the liquor traffic as a "local evil" in the province.²⁸) The issues were argued more from a trade and commerce perspective. The head of federal jurisdiction around which the discussion mainly turned was regulation of trade and commerce under section 91(2) of the *British North America Act*.

The decision in the *McCarthy Act* case raises a question as to whether Parliament could validly introduce a licensing system to allow a controlled availability for non-medical purposes of a substance that has hitherto been completely prohibited. It is difficult to see why it should be distinguishable from the licensing of drugs for medical purposes. The issue must be whether the legislative purpose is control of a harmful substance for the protection of health or whether it is simply a regulation of trade and commerce for revenue and other non-criminal purposes. The issue is that which was presented in the *Margarine* case²⁹ where a federal prohibition of the manufacture and sale of

margarine in the provinces was held to be invalid as a colourable use of the criminal law power. The purpose was not to protect the public health from a dangerous substance, since margarine was admitted to be a harmless substance, but to protect the dairy farmers from the competition of substitutes for butter. It was an attempt to regulate trade and commerce within the provinces—a matter which, as we have said, falls within exclusive provincial legislative jurisdiction, except to the extent that it can be shown in a particular case to be necessary to the effective exercise of federal jurisdiction with respect to extraprovincial trade and commerce. In a change from complete prohibition to legal availability through license or government monopoly the issue of validity—insofar as the criminal law power is concerned—would turn on whether the substance to be made available would continue to be regarded as a harmful substance for which controls are necessary. If it were, then there should be no reason, notwithstanding the *McCarthy Act* decision, why a federal system of distribution by licensing should not be valid. A federal monopoly of production and distribution might tend to obscure the legislative purposes somewhat, as suggesting an attempt to secure a trade monopoly for revenue purposes, but a good case could be made for government monopoly as an added safeguard in the control of quality and availability of a harmful substance. However, the *McCarthy Act* decision and the issue in the *Margarine* case were the reasons we raised a question in the *Interim Report* as to the validity of a federal system of distribution of cannabis, involving government monopoly, particularly if cannabis were to be made available on the basis of a judgement as to relative absence of potential for harm.

It is because of this doubt, however, that it is necessary to return to the possibility of the general power (as distinct from the criminal law power) as a possible basis for federal legislation in relation to non-medical drug use. In several decisions rejecting the general power as a basis for federal legislation, the Privy Council attempted to rationalize its decision in the *Russell* case by the suggestion that the consumption of liquor must be presumed to have been regarded as a national emergency. Later, in the *Canada Temperance Federation* case, the Privy Council abandoned this view of the matter, holding that the test of whether a matter falls within the general power is not the existence of an emergency, although that may be the occasion for the legislation, but whether “it is such that it goes beyond local or provincial concern or interests and must from its inherent nature be the concern of the Dominion as a whole....” But the examples given were aeronautics and radio, which, as suggested above, must be considered to have always been matters of national concern. Thus, the *Canada Temperance Federation* case, in which much hope has been placed for a broader application of the general power, does not really throw light on the circumstances in which a matter normally under provincial jurisdiction might be considered to have changed in character sufficiently to come within the general power. It does suggest, however, that the drug traffic may be regarded as such a matter quite apart from the notion of emergency.

The case that would have to be made in favour of the general power is that non-medical drug use has changed in character and become a matter of overriding national concern. This may appear to be so obvious to the layman as to make him wonder how a court could fail to agree. There are, however,

many matters falling to some extent under provincial jurisdiction which could be regarded as matters of national concern. If all matters of widespread concern to Canadians are to be deemed to fall under the plenary legislative jurisdiction of Parliament then we should soon have little left in the way of provincial jurisdiction. If non-medical drug use has been considered in the past to be a provincial matter, apart from the criminal law power, then we should have to ask when it changed in scope so as to become a matter of overriding national concern and when, if ever, it would be likely to cease to have this character. A declaration in the present circumstances that it has this character might be tantamount to affirming that it has always had it. A persuasive case could no doubt be made that non-medical drug use has so changed in character as to come under the general power, and the courts could be expected to pay great respect to a solemn declaration by Parliament that it had now become a matter, not merely of national concern, but of national emergency. But the appropriateness of such a declaration would depend on the legislative purpose to be served and the nature of the particular non-medical drug use to which it was directed. It is difficult to see how such a declaration would be appropriate to support federal legislation to make cannabis legally available under license or through government monopoly. The misuse of alcohol remains the most serious non-medical drug use problem in Canada; yet it is inconceivable that Parliament would consider declaring it a national emergency in order to assert a general jurisdiction beyond that which it can assert on the basis of the criminal law power.

JURISDICTION WITH RESPECT TO HEALTH

This view of the possibility of the general power as a basis for legislation of a non-criminal law nature in relation to non-medical drug use is reinforced by the view which has generally been taken of the distribution of jurisdiction with respect to public health. There has been some expression of judicial opinion that the general or residuary jurisdiction with respect to health rests with Parliament, on the basis of the general power,³⁰ but the weight of opinion,³¹ and the assumption on which governments have acted,³² is that it rests with the provinces. It is recognized, however, that Parliament may invoke the general power to cope with real emergencies.

Two important functions in respect of health are treatment and quarantine. In each case the general jurisdiction would appear to be provincial. The primary jurisdiction with respect to medical treatment lies with the provinces by virtue of section 92(7) of the *British North America Act* which confers upon provincial legislatures exclusive jurisdiction with respect to "The Establishment, Maintenance, and Management of Hospitals, Asylums, Charities, and Eleemosynary Institutions in and for the Province, other than Marine Hospitals". The federal jurisdiction with respect to the establishment of treatment facilities is a restricted one. The only express power is section 91(11), which gives Parliament jurisdiction with respect to "Quarantine and the Establishment and Maintenance of Marine Hospitals". In addition, Parliament may establish and manage treatment facilities in other areas of federal concern, such as the armed forces, the Indian population on reservations, the prison population in federal institutions, and immigration.

It is necessary to distinguish between the regulatory jurisdiction with respect to hospitals and other treatment facilities which, as a general rule, lies with the provinces, and the capacity of the federal government, through the exercise of its spending power, to provide financial assistance for the establishment of such facilities in the provinces. The use of the federal spending power in areas beyond federal legislative jurisdiction is a controversial issue, as a matter of policy, but it has not yet been ruled to be constitutionally invalid. By this device the federal government may impose conditions upon grants of financial assistance which will assure the implementation of certain policies and standards.

Federal jurisdiction with respect to "Quarantine and the Establishment and Maintenance of Marine Hospitals" in virtue of section 91(11) of the *BNA Act* has not been the subject of much judicial commentary. Most of this commentary has been unnecessary to the decision of the cases, but it has tended to affirm a general provincial jurisdiction on the subject of quarantine.³³ The most reasonable interpretation to apply to the word "quarantine" in section 92(11) is that it refers to port of entry or ship's quarantine.³⁴ This results from its juxtaposition with the subject of marine hospitals and the fact that it falls in the sequence of specific heads of jurisdiction dealing with what might collectively be described as maritime matters: "9. Beacons, Buoys, Lighthouses, and Sable Island; 10. Navigation and Shipping; 11. Quarantine and the Establishment and Maintenance of Marine Hospitals; 12. Sea Coast and Inland Fisheries; 13. Ferries between a Province and any British or Foreign Country or between two Provinces...." It would be highly incongruous to insert a general power of quarantine in this grouping of subject matters. Moreover, if, as the weight of opinion seems to indicate, the general jurisdiction with respect to public health lies with the provinces, it would be a serious qualification of that jurisdiction to deny it a general power of quarantine. We seem to have a case, similar to that of the federal power to regulate trade and commerce, where it is necessary to read a qualification into an apparently unqualified term in order to reconcile it with the legitimate requirements of provincial jurisdiction.

Whether the federal government has a true general power in relation to non-medical drug use, and the scope of the federal power with respect to matters of health, are particularly relevant in view of the non-penal alternatives suggested by article 22 of the *Convention on Psychotropic Substances*, 1971, which provides:

....when abusers of psychotropic substances have committed such offences, the Parties may provide, either as an alternative to conviction or punishment or in addition to punishment, that such abusers undergo measures of treatment, education, after-care, rehabilitation and social reintegration in conformity with paragraph 1 of article 20.

It is clearly established that the provinces have jurisdiction to provide for civil commitment or compulsory treatment. There is legislation for the involuntary confinement of mentally disordered persons in all of the provinces. The statement of the grounds for such confinement varies but generally speaking it is that the patient suffers mental disorder in such a degree that hospitalization is required "for his own protection or welfare or that of

others” or “in the interest of his own safety or the safety of others.” There is also legislative provision in some provinces for the compulsory treatment of drug dependent persons, including alcoholics, either under the mental health legislation or some special statute. The constitutional basis for compulsory treatment legislation in the provinces would appear to be section 92(7) of the *BNA Act* respecting the establishment of hospitals and asylums, section 92(13) respecting property and civil rights, including questions of incapacity and the protection of incapables, and section 92(16) which covers the residual provincial jurisdiction with respect to matters of health.³⁵

In the absence of a true general power with respect to non-medical drug use or a general jurisdiction with respect to matters of health, federal power to provide for compulsory treatment must be grounded on the criminal law power. On this issue the Special Committee of the Senate on the Traffic in Narcotic Drugs, reporting in 1955, expressed itself as follows:

The Committee points out that it is not within the constitutional authority of the federal government to assume responsibility for treatment of drug addicts nor to enact the kind of legislation necessary in that connection. This legislation would need to include the compulsory treatment of addiction, the legal supervision and control over the individual during treatment and the right of control of an individual following treatment to prevent his return to the use of drugs, former associations or habits. These are considered to be matters beyond the competence of the federal government.³⁶

In spite of this, Parliament provided for the compulsory treatment of drug offenders in Part II of the *Narcotic Control Act* in 1961. However, this part of the Act has never been put into force by proclamation. Whether this is because of doubts about the constitutional validity of these provisions or the failure to develop suitable treatment methods and facilities or later reservations by the government as to the advisability of compulsory treatment in principle, or some combination of these, is not clear. In any event, the provisions of Part II of the Act do provide a convenient framework for consideration of the jurisdiction of the federal Parliament with respect to compulsory treatment based on the criminal law power.

Part II provides for two kinds of special disposition of persons convicted of offences under the Act: preventive detention for an indeterminate period in a penitentiary and sentence to custody for treatment for an indeterminate period in an institution operated under the federal penitentiary system.

Preventive detention would apply in the case of a conviction for trafficking, possession for the purpose of trafficking or illegal importing or exporting. Where a person was convicted of one of these offences, and had previously been convicted at least once of such an offence, or had been previously sentenced to preventive detention under Part II, the court would be obliged to sentence such person to preventive detention.

The *Criminal Code* provisions for preventive detention of habitual criminals and dangerous sexual offenders, although challenged on the ground that they inflict punishment for a status or condition and that they impose “cruel and unusual punishment” in violation of the *Canadian Bill of Rights*, have been held to be constitutionally valid.³⁷ This makes it probable, although not

inevitable, that the provision for preventive detention in Part II of the *Narcotic Control Act* would also be held to be valid. However, since the provision makes the sentence mandatory and leaves the court without the discretion which it has under the *Criminal Code* provisions, a stronger case could be made against its validity on the ground of cruel and unusual punishment. The sentence could be called for in some very questionable circumstances, for example, a second offence of marginal trafficking in cannabis.

The sentence to custody for treatment in Part II of the *Narcotic Control Act* is clearly regarded by the legislation as something different from preventive detention, although the effect may be similar, so presumably its constitutional validity is not automatically disposed of by the arguments applicable to the latter. It has a voluntary aspect, in that it may be ordered pursuant to an application by the accused or his counsel, but it may also be ordered upon application by counsel for the Crown. For this reason we shall refer to it as compulsory treatment. It applies not only in the case of a conviction for any of the offences for which preventive detention is to be ordered, but also in the case of conviction for simple possession under the *Narcotic Control Act*. The condition is not a previous conviction of any of these offences, as in the case of preventive detention, but the fact of being a "narcotic addict". This expression is defined in the Act to mean a person "who through the use of narcotics...has developed a desire or need to continue to take a narcotic, or...has developed a psychological or physical dependence upon the effect of a narcotic." Thus a person who was convicted of simple possession of cannabis for the first time could, theoretically at least, be sentenced to custody for treatment for an indeterminate period if the court found that he had developed a desire to continue to take cannabis. Moreover, under the provisions as presently worded, a person could be sentenced to custody for treatment for addiction to a drug different from the one involved in the offence of which he was convicted. Thus there might be little or no connection between the offence and the condition justifying the sentence.

In other respects the legislation has obviously been framed to suggest as close a connection as possible with the criminal law process. The order of commitment for compulsory treatment is called a "sentence" to suggest the criminal law disposition of a case. It is to be "in lieu of any other sentence that might be imposed for the offence of which he was convicted." The legislation makes criminal conviction a prior condition, and does not attempt to provide for compulsory treatment as an alternative to further prosecution, which would make it independent of guilt or innocence. The court may order that the accused be examined for addiction while a charge is pending, but a sentence to custody for treatment is to be imposed only if he is convicted. A person under such sentence would come under the jurisdiction of the federal penitentiary and parole systems. He would be deemed to be an "inmate" within the meaning of the *Parole Act* and subject to release and supervision in accordance with that act.

While these provisions strongly suggest that Parliament considered its jurisdiction with respect to compulsory treatment (to the extent that it existed at all) to be limited to criminal cases, the legislation contemplates federal

provincial agreements whereby the federal penal authorities could acquire custody of narcotic addicts who had not been charged with an offence but who had been committed for compulsory treatment under provincial legislation. Under such an agreement a province would make use of the federal penitentiary and parole systems for the confinement, release and supervision of persons so committed. Part II provides (as does complementary provincial legislation³⁸) that persons committed under the provincial legislation would be deemed, for purposes of the federal penitentiary and parole systems, to have been sentenced to custody for treatment under Part II.

If compulsory treatment is to fall within the criminal law power it must be seen either as a valid disposition of a criminal law case or as an aspect of Parliament's jurisdiction to legislate for the prevention of crime. To be valid as a criminal law disposition it would seem that a disposition must be reasonably related to the issue of criminal responsibility. There is no doubt that Parliament may validly confer on the courts a wide range of discretion as to disposition. This includes suspended sentence and probation, and it could also include absolute and conditional discharge, which would even preclude conviction. It would seem that the essential thing is that there must be a prohibition of conduct with provisions for penalty, and a disposition of the case that is reasonably related to a finding as to criminal responsibility. This is the case with confinement under the provisions of the *Criminal Code* of a person who is found to be unfit to stand trial³⁹ or is acquitted on account of insanity.⁴⁰ The condition for which he is confined is directly related to the issue of criminal responsibility.⁴¹

As it presently stands in Part II, the sentence to custody for treatment would not appear to be so related. The sentence might be imposed for addiction to a drug other than that involved in the offence for which the accused was convicted. Certainly there would be a bona fide criminal law offence, charge and conviction, and some disposition would be called for. But the provision concerning preventive detention shows that confinement for an indeterminate period is not contemplated as an appropriate disposition for a case of first offence under the *Narcotic Control Act*, and in any event not for the offence of simple possession. Thus the sentence to custody for treatment must be in consideration of the condition of addiction rather than the offence of which the accused has been convicted. When an offence that is punishable by imprisonment for a maximum of seven years is the occasion of a "sentence" for an indeterminate period, based on the fact of addiction, then it is doubtful if such sentence can be said to be reasonably related to the issue of criminal responsibility.

There is no doubt that federal inmates may be validly exposed to medical treatment in the course of their confinement, but the coercive aspect of compulsory treatment is the confinement; it is that which is intended to have the compelling influence, and to force the inmate to accept the treatment that is available, if there is any. Involuntary confinement, actual or threatened, is of the essence of compulsory treatment. You cannot have compulsory treatment without it, and it cannot, therefore, be considered to have been imposed to serve some purpose of criminal law disposition, such as deterrence, isolation or rehabilitation. In the case of imprisonment, it is rehabilitation qua

criminal that is sought, not the cure of a medical condition. At the end of his term the offender must be released, whether he is actually rehabilitated or not. Confinement for an indeterminate period for the treatment of addiction implies that the addict will not be released until he is deemed to be cured. His criminal propensities are neither here nor there; it is his medical condition that is in issue.

Now it may be said that the two are closely related; that addiction will compel the addict to engage in the crime of unauthorized possession of narcotics and in the crime of theft and trafficking to support his habit. From this it may be argued that compulsory treatment is a measure for the prevention of crime. Certainly, the federal criminal law power includes a preventive as well as a remedial jurisdiction.⁴² Can compulsory treatment be regarded as a valid exercise of the preventive aspect of the criminal law power?

Clearly, there must be some reasonable limits to the scope of this jurisdiction; otherwise, Parliament could invoke the criminal law power to legislate in relation to a great variety of social conditions which have some bearing on crime. The prevention, it is submitted, must be directed to a more or less specific danger of criminal acts. This is the case with preventive detention of habitual criminals and dangerous sexual offenders, a bond to keep the peace,⁴³ and orders not to commit a specific offence in the future.⁴⁴ It is also the case with juvenile delinquency legislation which, while admittedly a very broad exercise of the preventive criminal law jurisdiction of Parliament,⁴⁵ does turn on the notion of an offence and responsibility for specific violations of law.

In the case of addiction we would be inferring the probability of future criminal acts, not from a history of criminality as in the preventive detention cases, or a threat of criminal acts, as in the bond to keep the peace, but from the compulsive nature of the medical condition. By making it impossible for the addict to obtain the drug legally we compel him to resort to criminal acts, and then we say that his addiction is the cause of his crime. The prohibitions against trafficking and illegal possession are not for some economic purpose, such as the regulation of trade and commerce, but precisely to prevent the harm caused by the non-medical use of opiate narcotics, including the harm of addiction. This is the criminal law means of attempting to prevent this harm. The addiction itself is not the crime. It is submitted that the compulsory medical treatment of addiction must be regarded as a non-criminal law means of dealing with this harm.

Thus while compulsory treatment may have the consequential effect of preventing or reducing crime it is directed to the elimination of a medical condition rather than the deterrence of crime. The cure of addiction does not assure that a person will not engage in trafficking or casual use. Neither of these depend on addiction. The confinement does have the effect of preventing crime, but as we have suggested above, the confinement must be seen as the means of compelling acceptance of treatment rather than prevention of crime. Otherwise, it is indistinguishable from preventive detention and should be justified as such, on a clear showing of prior and present criminality, and serious danger to the public.

The general conclusion that we draw from this analysis is that it is doubtful

if the compulsory treatment of addiction is sufficiently related to specific issues of criminal responsibility, either preventively or remedially, to be capable of being grounded jurisdictionally on the criminal law power. If there is a federal jurisdiction to provide for compulsory treatment of addiction it ought logically to exist as a general one, independent of the criminal law power, or not at all. If there is a federal power to provide for compulsory treatment of addiction in order to prevent crime then there ought logically to be a federal power to provide for the compulsory treatment of psychopathic conditions which may lead to crime. It is perhaps significant that Parliament has not attempted to disguise the preventive detention of the habitual criminal or the dangerous sexual offender as compulsory treatment, although their condition may be one which calls for treatment.

We do not deny that there is a persuasive argument to be made for compulsory treatment as a measure for the prevention of crime; all we say is that its implications carry us beyond the criminal law power. It is on a par with other legislative initiatives which may remove conditions, personal or social, which are conducive to crime. Nor do we deny that Parliament may validly provide medical treatment for the criminal offender, to which he may be more or less compulsorily exposed by virtue of his confinement. We merely say that such treatment is not really related to the issue of criminal responsibility so as to form a true part of the disposition of the case. The possible exception is where the addiction can be shown to be directly related to the crime of which he is convicted (as in the case of the simple possession of a drug to which he is addicted). Then the case may be said to be analogous to one in which the accused is acquitted on the ground of insanity. If that is to be the case then we should say what we mean: we should make a finding of addiction the alternative to a finding of criminal responsibility. It should be noted that the Supreme Court of the United States has held that it is unconstitutional to make addiction a crime on the ground that it is cruel and unusual punishment in violation of the Eighth and Fourteenth Amendments of the American Constitution.⁴⁶ American civil commitment statutes sometimes expressly provide that civil commitment which is ordered while a charge is pending is not a criminal conviction. On a similar view of the matter the "sentence" to custody for treatment in Part II would have to be considered to be a non-punitive commitment for compulsory treatment in lieu of the punishment which might have been imposed in respect of the offence for which the addict was convicted. The more we attempt to relate compulsory treatment to the criminal law power the more we are obliged to regard it as what many of its critics contend it is—imprisonment under another name.

The provision in Part II of the *Narcotic Control Act* and provincial legislation declaring a non-criminal addict committed for treatment under provincial law to be deemed to be under sentence to custody for treatment, and therefore an inmate within the meaning of the *Parole Act*, would appear to be of doubtful validity. A province may validly provide for compulsory treatment of narcotic addicts, and as a general rule may validly use federal administrative agencies and institutions for the implementation of its legislation, but it is doubtful if either the federal Parliament or the provincial legislatures can validly impose upon a narcotic addict who has not been convicted of a narcotic offence the status of an inmate for purposes of the

Parole Act. There would appear to be a significant difference between the delegation that is contemplated here and that which has been permitted to facilitate the application of uniform rules and the avoidance of administrative duplication in the fields of natural products marketing and highway transportation.⁴⁷ Here there is a qualitative difference in the nature of the legislative and administrative impact on each side of the jurisdictional division. There is an attempt to give a criminal character to a civil status without any bona fide criminal law basis for it. The enabling provision may be necessary to authorize the federal authorities to deal with the addict, but it effects a change of status which neither legislature can validly impose.

Thus there is considerable doubt about the scope of federal jurisdiction to provide for compulsory measures of treatment, education, after-care, rehabilitation and social reintegration as an alternative to conviction or punishment or in addition thereto. This policy option, suggested by the *Convention on Psychotropic Substances*, 1971, would appear, on constitutional and practical grounds to be open only to the provinces because of their jurisdiction and practical involvement with respect to such matters. Such a policy development involves a shift in constitutional emphasis from federal to provincial jurisdiction. We do not deny that there is considerable scope for a variety of dispositions of an essentially non-punitive nature in criminal cases, but as we have attempted to show in the discussion of compulsory treatment, there is considerable difficulty, and probably serious disadvantages, in attempting to relate a public health approach to issues of criminal responsibility. This the federal government is obliged to do if it attempts to develop a public health model for dealing with the non-medical user of drugs without a clear basis in the general power for such an approach.

In considering whether Parliament should have legislative jurisdiction to provide for compulsory measures of treatment or indoctrination in lieu of criminal law conviction, the courts might well be influenced by the fact that there is an international agreement contemplating such a policy. But the law at present is that an international agreement does not add anything to the legislative jurisdiction which Parliament otherwise has under the *BNA Act*.⁴⁸ The federal government has the executive power to make international agreements on behalf of Canada, but it may not in a particular case have the full legislative power required to implement an agreement by suitable domestic legislation. Such power may lie wholly or partly with the provincial legislatures. The federal government does not increase its legislative power by entering into an international agreement. That power continues to be determined by the normal distribution of legislative jurisdiction under the Canadian constitution. Thus, where the implementation of a proposed international agreement will require provincial legislative action, the agreement ought logically to be preceded by federal-provincial consultation. Canada fulfils its obligations under an international agreement if it implements the agreement by appropriate legislative and administrative action, whether it be federal or provincial.

PROVINCIAL POWER TO CREATE PENAL OFFENCES

We must now consider whether there is a provincial jurisdiction to make conduct related to non-medical drug use a punishable offence. For example, if the federal Parliament were to repeal its prohibition of the simple possession of a particular drug, could the provinces validly enact such a prohibition?

The provincial power, in virtue of section 92(15) of the *BNA Act*, to impose penalties (including imprisonment) for the violation of provincial laws can only be invoked if the province has the jurisdiction under some other head in section 92 to legislate in relation to a particular subject matter. The provincial penal jurisdiction is an ancillary power that is used to give effect to legislation that is valid under some other head of provincial jurisdiction. The provinces do not possess a primary and independent power, such as the federal criminal law power, to prohibit conduct with penal consequences. Such prohibition must be related to some other head of jurisdiction in section 92.

The federal criminal law power permits Parliament to select any conduct for criminal law prohibition, whether or not Parliament could otherwise exercise a regulatory jurisdiction with respect to such conduct. For example, Parliament can prohibit certain conduct in the field of highway traffic, such as dangerous and impaired driving, although it does not have the power to regulate highway traffic. There is one limitation on the exercise of the federal criminal law power: it must not be a mere pretense or "colourable" use to usurp a provincial jurisdiction. It must be used for a true criminal law purpose and not for a legislative purpose that lies outside federal jurisdiction. An example of a colourable use of the criminal law power was the federal attempt to prohibit the manufacture and sale of margarine in the provinces, referred to above. The courts have not attempted to draw an exhaustive list of valid criminal law concerns. They have recognized that the criminal law is an expanding field, and that Parliament must be able to create new crimes. It was said in the *Margarine* case that public peace, order, security, health and morality were "the ordinary though not exclusive ends" served by the criminal law.

There may be both federal and provincial penal provisions in a particular field of activity. Where valid federal and provincial legislative provisions come into conflict the federal legislation prevails. The provincial legislation is rendered inoperative to the extent of such conflict.⁴⁹

To what extent can the provinces, in the absence of conflicting federal legislation, validly attach penal consequences to conduct in the field of non-medical drug use? There are precedents in the field of liquor control which appear to afford a basis for such jurisdiction, but they require careful examination. The provinces clearly have the jurisdiction to regulate the distribution and possession of liquor, and they can make it an offence to distribute or possess liquor except as permitted by the regulatory legislation which they enact. Such a legislative approach is similar to that reflected by the *Narcotic Control Act* and the *Food and Drugs Act*. Liquor is made available upon certain conditions and in a certain manner, and any other dealing in it is prohibited. But the provinces may go further; the courts have held that they

may prohibit the distribution of liquor altogether.⁵⁰ It is this jurisdiction that is most relevant to the consideration of whether the provinces could prohibit the conduct involved in other non-medical drug use.

The constitutional basis of provincial liquor prohibition, as articulated in the cases, is somewhat ambiguous. The provincial suppression of the liquor traffic has been justified as the abatement or prevention of a "local evil", resting on provincial jurisdiction with respect to matters of a merely local or private nature in the province under section 92(16) of the *BNA Act*. It is not clear what was contemplated as the "evil" in the distribution and consumption of liquor but the language used in the cases is strongly suggestive of morality.

If provincial liquor prohibition is to be considered as a penal suppression of conduct on the ground of public morality then it must, in the light of later decisions, be considered to be a constitutional anomaly, as we suggested in the *Interim Report*. The Supreme Court of Canada has clearly rejected the notion of "local evil" as a basis for provincial legislation of a criminal law character,⁵¹ and other decisions have made it plain that the provinces do not have a jurisdiction to create penal offences for the enforcement of morality.⁵²

It has been suggested, however, that the provinces can validly prohibit the conduct involved in non-medical drug use as an aspect of provincial jurisdiction with respect to health, and provincial liquor prohibition could be reconciled with this view of the matter. The few cases on the point⁵³ are conflicting and reflect the doubt on the issue which we expressed in the *Interim Report*. There must obviously be a provincial jurisdiction to prohibit certain conduct with penal consequences in order to protect public health. Otherwise there can be no effective provincial regulatory jurisdiction with respect to health. The fields of sanitation and infectious disease are typical examples where there must be this power. In the intention behind the criminal law suppression of conduct in relation to non-medical drug use there is, however, a blend of legislative purposes. There is undeniably a bona fide health concern, but there is also a public morality concern. When non-medical drug use is spoken of as an "evil" there is concern not only for the effect on the health of individuals but also concern for the effect on the general tone and capacity of the society—for harm that is not strictly a matter of health. This is a concern for public morals—for the effect of non-medical drug use on character. Are the courts not obliged to assign this dual purpose to provincial attempts to prohibit such conduct, however they may be couched in the form of health legislation? This is the basis for doubt as to provincial jurisdiction to make conduct related to non-medical drug use a punishable offence. The problem is to determine the dominant legislative purpose which gives the legislation its true nature and character.

We have now come to the conclusion that such a jurisdiction can be justified as a protection of health, and as a practical matter can hardly be denied in view of the precedents in favour of provincial liquor prohibition. These include the right to make public drunkenness an offence.⁵⁴ Liquor prohibition must necessarily involve the right to prohibit any and all conduct involved in the distribution and use of liquor, and it is impossible to distinguish between provincial control of liquor and provincial control of other drugs

as legislative concerns. They are both concerned with the effect of consumption on the individual and the community generally. Unless the courts are to say that a mistake was made in the liquor prohibition cases there seems to be no way of making a distinction between the two. The "local evil" spoken of in the liquor cases may be thought of as a matter of public morality but it may equally be thought of as a matter of injury to health. We have come to the conclusion that if provincial legislation is so framed as to clearly indicate a concern with the effect of non-medical drug use on the health of the individual it would have a valid provincial aspect notwithstanding that it might incidentally serve other purposes such as the prevention of social harm or the deleterious effects of drug use upon society generally.⁵⁵

JURISDICTION WITH RESPECT TO EDUCATION

Education falls within exclusive provincial jurisdiction under section 93 of the *BNA Act*. At the same time, a distinction must be made between education in the organized sense, involving formal instruction in educational institutions, and education in the broadest sense, including public education through a variety of media and facilities in which the federal government clearly has a role to play.

To the extent that drug education is to be furnished in the school system, it must be deemed to come within provincial jurisdiction. But there is nothing to prevent the federal government from contributing to drug education in the larger sense, outside the formal educational system, by a variety of informational programs making use of all the media of communication. It may also, of course, take a lead in the development of the necessary informational basis for provincial drug education programs and may indeed collaborate in the development of the educational materials for use in such programs.

The distinction drawn in the *Interim Report* between information and education was directed more to the nature of materials than to jurisdictional issues. The distinction was meant to emphasize that the processes and considerations which go into the development of sound information by research and evaluation may differ from those which go into the development of educational materials based on such information. The jurisdictional issue turns rather on the distinction between the organized educational system and activity of a general educational value outside that system. It would be utterly impracticable if every communication which might be deemed to be of an educational value were held to be a matter of exclusive provincial jurisdiction. At the same time there is obviously a domain in which the formal educational system may be extended by the use of audio-visual techniques. Such development raises a clear issue of provincial jurisdiction but it does not preclude federal activity of general educational value by similar means of communication.

LEGISLATION AND LAW ENFORCEMENT

HISTORY

Our legislative policy with respect to cannabis goes back to 1923. In the early 1920s public concern about non-medical drug use was stimulated by a series of articles written for *Maclean's Magazine* by Mrs. Emily Murphy, a police magistrate and judge of the Juvenile Court in Edmonton, Alberta, and later incorporated by her in a book entitled *The Black Candle*.⁵⁶ She described the evils of drug use in somewhat sensational terms. The Chief of Police of Los Angeles was quoted as having made the following statement about marijuana:

Persons using this narcotic smoke the dry leaves of the plant, which has the effect of driving them completely insane. The addict loses all sense of moral responsibility. Addicts to this drug, while under its influence, are immune to pain....While in this condition they become raving maniacs and are liable to kill or indulge in any form of violence to other persons, using the most savage methods of cruelty without, as said before, any sense of moral responsibility.⁵⁷

It is thought that Mrs. Murphy's writings were probably responsible for the inclusion of marijuana in the Schedule to *The Opium and Narcotic Drug Act* in 1923.⁵⁸ There was only passing reference to the subject in the debate and no discussion of the reasons for its inclusion. In any event, a decision was made in 1923, without any apparent scientific basis nor even any real sense of social urgency, to place cannabis on the same basis in the legislation as the opiate narcotics, such as heroin, and that is the way it has remained on the statute books ever since.

In 1955 the Special Senate Committee on the Traffic in Narcotic Drugs made the following observation on marijuana:

Marijuana is not a drug commonly used for addiction in Canada, but it is used in the United States and also in the United Kingdom by addicts.

No problem exists in Canada at present in regard to this particular drug. A few isolated seizures have been made but these have been from visitors to this country or in one or two instances from Canadians who have developed the addiction while being in other countries.⁵⁹

Over the years there was an increase from time to time in the severity of the penalties applicable to the narcotic offences, and this increase in severity was automatically applied to cannabis. In 1954 the maximum sentence for the offences of trafficking and possession for the purpose of trafficking was raised from seven to fourteen years and in 1961 to life imprisonment. In the early years, at least, the call for increased severity in the narcotic laws seems to have been inspired in some measure by anti-asiatic feeling.⁶⁰ It is ironic that the severity which was originally seen as falling mainly upon persons of Asiatic origin, should have fallen ultimately upon middle-class youth.

AUTHORIZED DISTRIBUTION AND POSSESSION OF CANNABIS

Cannabis was formerly used to some extent for medical purposes in Canada, although there no longer appears to be any demand for permission to make it legally available for such purposes. It is not clear what the policy of the government would be if there was such a demand. Under the terms of the *Single Convention on Narcotic Drugs, 1961*, it could be made legally available for medical purposes, although it is included among the drugs in Schedule IV which the parties are invited to restrict to purposes of medical and scientific research. Federal law does not prevent doctors from prescribing cannabis for medical purposes if they can obtain a legal supply of it, but they cannot be in authorized possession of it unless they obtain it from a licensed source of supply.

The distribution and possession of cannabis is authorized under certain conditions, for purposes of research and drug analysis.

The *Narcotic Control Regulations* make provision for authorization to be given by the Minister to purchase, possess and administer cannabis for scientific purposes. Section 47 of the Regulations⁶¹ provides as follows:

- (1) Where he deems it to be in the public interest and the interests of science, the Minister may authorize in writing,
 - (a) any person to purchase and possess a narcotic, and
 - (b) notwithstanding section 38,
 - (i) any person to administer that narcotic to an animal, and
 - (ii) any practitioner of medicine to administer that narcotic to a person,

for the purposes and subject to the conditions set out in the authorization.

- (2) The Minister may, at any time, revoke the authorization referred to in subsection (1) and require any person in possession of a narcotic pursuant to that authorization to deliver the narcotic to the Minister of his agent.

There are similar provisions under the *Food and Drug Regulations* for controlled drugs and restricted drugs.

The Minister also has a discretion to authorize the cultivation of marijuana for scientific purposes.⁶²

Departmental procedures and policy with respect to approval of research, as well as our national policy with respect to the production of cannabis for scientific purposes, will be discussed in a subsequent report.

Section 47 of the *Narcotic Control Regulations* also makes provision for the delivery of cannabis and other drugs covered by the Act to authorized persons for purposes of identification or analysis.⁶³ The authority is somewhat circumscribed. It permits a person who is under treatment by a doctor by reason of the use of drugs to deliver a drug to the doctor who in turn may deliver it for identification, or analysis, to a person who has been authorized for such purpose by the Minister. The delivery (although presumably not the possession) of the drug by the patient, and the possession and delivery of it by the doctor are protected by the regulation; but the same is not true of anyone else

who may wish to deliver drugs for such purpose. This policy with respect to drug analysis is discussed in a subsequent report.

There is a further provision in the Regulations respecting lawful possession of cannabis. It is section 49, which reads as follows:

An inspector, a member of the Royal Canadian Mounted Police, constable or peace officer or member of the technical or scientific staff of any department of the Government of Canada, of a province or university, may be in possession of a narcotic for the purpose of, and in connection with, his employment therewith.

The precise scope of this provision is not too clear, but presumably it is intended to authorize possession in the course of law enforcement, authorized drug analysis and scientific research. Government personnel authorized to be in possession of cannabis would include analysts, appointed under the *Food and Drugs Act*, whose certificates make proof of the nature of a drug for purposes of prosecution.

PROHIBITIONS AND PENALTIES

Offences involving cannabis are indictable offences (with the option to proceed by way of summary conviction in a case of simple possession) and are subject, under the *Narcotic Control Act*, to the same penalties as offences involving the drugs which are true narcotics:

A minimum of seven years and a maximum of life imprisonment for unauthorized importing or exporting;⁶⁴

A maximum of life imprisonment for trafficking⁶⁵ and possession for the purpose of trafficking;⁶⁶

A maximum of seven years' imprisonment for the unauthorized cultivation of marijuana;⁶⁷

For unauthorized possession⁶⁸ (that is, simple possession), depending upon whether the Crown proceeds by way of indictment or summary conviction:

upon indictment, a maximum of seven years' imprisonment, and upon summary conviction, a maximum of six months' imprisonment and/or a fine of one thousand dollars for the first offence and one year's imprisonment and/or a fine of two thousand dollars for subsequent offences.

Importing or Exporting

Unauthorized importing is clearly regarded as the most serious offence under the *Narcotic Control Act*. It is the only offence under the Act which carries a mandatory minimum sentence. It was introduced into the law in 1961 pursuant to a recommendation by the Special Senate Committee of 1955, which clearly had the opiate narcotics in mind. It has presented the courts with serious difficulty, particularly in the case of young persons found to be importing cannabis. Because of the severity of the minimum sentence, it is understood to be the policy of federal prosecutors to proceed under this section only in serious cases involving significant quantities.⁶⁹ (Under the *Food and Drugs Act* importing or exporting falls within the definition of trafficking and does not carry a minimum sentence.)

In 1970⁷⁰ there were 26 convictions for illegal importation or exportation of cannabis and only two convictions for illegal importation or exportation of heroin. Seventeen of the 26 convictions with respect to cannabis were in the age group from 21 to 24 years (Table A.9). Of the 28 convictions for illegal importation under the *Narcotic Control Act* in 1970, 25 were in Quebec. This is explained by the fact that Montreal is one of the chief ports of entry for smuggling in North America. In 1971, 22 out of 26 convictions for illegal importation under the *Narcotic Control Act* were for cannabis. Once again, the overwhelming majority were in Quebec, and the age distribution was much the same as in 1970, with over 50% of the cases in the age group 21–24 (Table A.10).

Trafficking

To traffic under the *Narcotic Control Act* means to “manufacture, sell, give, administer, transport, send, deliver or distribute”, or to “offer to do” any of these things without authority.⁷¹ For the offence of trafficking it is not necessary to show that the drug is actually a drug covered by the Schedule of the Act. It is sufficient that it be represented or held out to be such.⁷² It is not necessary to be in possession to be a trafficker.⁷³ The offence of trafficking by offering to do so does not require actual possession of the drug which is offered.⁷⁴ The purchaser from a trafficker is not guilty of the offence of trafficking.⁷⁵

Attempts have been made to extend the definition of trafficking by relying on the word “transport” in the definition, and arguing that any movement of the drug from one place to another is sufficient for trafficking. The courts have held that the word “transport”, when read in the context of other words in the definition, cannot be applied to the movement of the drug by the accused for his own use.⁷⁶ It has recently been held, however, that transporting for one’s own use by an “innocent agent” amounts to trafficking.⁷⁷

The statute expresses no distinction at all between qualitatively different kinds of trafficking, and the courts have not read any such distinction into the legislation. There is obviously a big difference between selling the drug for monetary consideration and giving it to a friend. Selling it at cost to an acquaintance is different from selling to a variety of people to make a profit. Selling it on a small scale to make a marginal profit—perhaps to support one’s own use—is not the same as organizing and controlling a large entrepreneurial organization. As can be seen, trafficking activities range along a spectrum from a kind of act not far removed in seriousness from simple possession to the extensive activities of the stereotyped exploiter and profiteer whose image led to the kinds of penalties associated with trafficking. The legislature has left it to the courts to develop sentencing policies reflecting important differences. The range of sentences for trafficking offences will be discussed in greater detail in the section of this Chapter on Sentencing Policy.

In 1970 there were 606 convictions for the offence of trafficking under the *Narcotic Control Act*. Four hundred and forty-six of these were for trafficking in cannabis (Table A.1). In 1971 there were 565 convictions for trafficking under the Act, of which 476 were for cannabis (Table A.2).

Possession for the Purpose of Trafficking

Unlike the case of trafficking, where it is sufficient that the drug be represented or held out to be one which is included in the Schedule of the Act, it is necessary for the offence of possession for the purpose of trafficking that the accused actually be in possession of such a drug.

A certificate of an analyst designated under the *Narcotic Control Act* or the *Food and Drugs Act* is admissible in evidence as to the nature of a drug in any prosecution for offences under the Act.⁷⁸ In order for such a certificate to be admissible the party intending to produce it must, before the trial, give the other party reasonable notice of such intention together with a copy of the certificate. The party against whom the certificate is produced may, with leave of the court, require the attendance of the analyst for purposes of cross-examination.⁷⁹

A case of possession for the purpose of trafficking proceeds as if it were two trials. The law⁸⁰ provides that if the accused does not plead guilty the trial shall proceed as if it were a prosecution for the offence of simple possession, and after the close of the case for the prosecution and after the accused has had an opportunity to make full answer and defense, the court shall make a finding as to whether or not the accused was in possession of cannabis contrary to the prohibition against simple possession.⁸¹ If the court finds that the accused was not in possession of cannabis contrary to that provision he shall be acquitted, but if it finds that he was in possession of cannabis contrary to that provision, he shall be given an opportunity of establishing that he was not in possession of cannabis for the purpose of trafficking, and thereafter the prosecutor shall be given an opportunity of adducing evidence to establish that the accused was in possession for the purpose of trafficking. If the accused establishes that he was not in possession of cannabis for the purpose of trafficking, he shall be acquitted of the offence as charged but he shall be convicted of the offence of simple possession and sentenced accordingly. If the accused fails to establish that he was not in possession of cannabis for the purpose of trafficking, he shall be convicted of that offence and sentenced accordingly.

This exceptional provision concerning the burden of proof is usually justified on the ground that it is ordinarily very difficult to prove the intention to traffic. In the absence of an admission, proof of such intention must be by way of inference from circumstantial evidence, such as the quantity of the drug discovered in the accused's possession.⁸²

There has been a serious question as to the precise nature of the burden placed upon the accused by this procedure and the extent to which it operates in practice as a departure from the traditional presumption of innocence. The courts have distinguished the secondary burden of adducing evidence of a particular fact from the primary burden of proving it when all the evidence is in.⁸³ The primary burden is always on the Crown to establish all the elements of the crime by proof beyond a reasonable doubt. By the special procedure with respect to the offence of possession for the purpose of trafficking the Crown is relieved of the burden of adducing evidence of the intention to traffic. Proof of unauthorized possession is evidence from which a court may

infer an intention to traffic. In effect, it raises a statutory presumption of such intention. The difficult question has been to determine what the accused must show to rebut this presumption and whether the burden which is cast upon him violates the right affirmed by the *Canadian Bill of Rights* "to be presumed innocent until proved guilty according to law..."⁸⁴

The issue has been the meaning to be given to the word "establish" in the provision "...if the accused establishes that he was not in possession of the narcotic for the purpose of trafficking, he shall be acquitted...if the accused fails to establish that he was not in possession of the narcotic for the purpose of trafficking he shall be convicted...." The question has been whether it is sufficient for the accused to raise a reasonable doubt as to the intention to traffic or whether he must prove that he did not have such an intention by a preponderance of evidence or on a balance of probabilities. Until June 1971 the weight of the judicial authority was that it was sufficient for the accused to raise a reasonable doubt. In our *Interim Report* we expressed the law on the point as follows:

...the legislation has deemed that evidence of unauthorized possession may support an inference of the mental element without any further affirmative evidence on this point, unless the accused gives a reasonable probable alternative explanation for his possession, whether from his own evidence, or other witnesses, or from evidence already before the Court. The Court need not draw this inference even when the accused does not adduce any evidence, but he takes the risk it will do so. In all cases, though, if the accused by argument or evidence or cross-examination of the Crown witnesses establishes a reasonable doubt about his alleged purpose of trafficking, he must be acquitted of the offence of possession for the purpose of trafficking. (Paragraph 379)

This statement was based on such decisions as *Regina v. Hartley and McCallum*,⁸⁵ in which Davey J.A. of the British Columbia Court of Appeal expressed himself as follows:

Crown counsel submits that in order to discharge that burden the appellant must show upon a preponderance of the evidence or on the balance of probabilities that he was not trafficking....

It seems to me that it is established by the cases relied upon by Crown counsel...that if the prisoner by argument or evidence or cross-examination of the Crown's witnesses establishes a reasonable doubt as to whether he had possession of the narcotic for the purpose of trafficking, he must be acquitted of that particular offence, namely, having possession for the purpose of trafficking, and in the result he ought to be convicted only of ordinary possession.

Later in the case of *Regina v. Silk*⁸⁶ the same court expressed the view that to deprive the accused of the benefit of a reasonable doubt on the issue of the intent to traffic would be contrary to the presumption of innocence protected by the *Canadian Bill of Rights*. In other words, the Court held that the presumption of innocence is the right of the accused to be presumed innocent unless and until his guilt is proved beyond a reasonable doubt, and that this presumption necessarily carries the right to the benefit of a reasonable doubt on the issues of fact, whether it exists on the evidence offered by the Crown or whether it is raised by the evidence of the accused.

This would no longer appear to be the law as a result of the decision of the Supreme Court of Canada in *Regina v. Appleby*.⁸⁷ There the Court was considering the statutory presumption created by section 237(1)(a)⁸⁸ of the *Criminal Code* whereby an accused who is proved to have occupied the seat ordinarily occupied by the driver of a motor vehicle is "deemed to have had the care or control of the vehicle unless he establishes that he did not enter or mount the vehicle for the purpose of setting it in motion", but the reasoning, at least of the majority in the case, would appear to be equally applicable to the burden of proof thrown upon the accused in a case of possession for the purpose of trafficking. Indeed, the Court considered the decisions with respect to the *Narcotic Control Act* and the *Food and Drugs Act*, including the *Hartley* and *Silk* cases. The Court held that the statutory presumption could not be rebutted by proof which merely raised a reasonable doubt; that a burden was placed on the accused to negate the presumption by a preponderance of evidence or proof which carried on a balance of probabilities. In other words, he has the burden of proof which applies in civil proceedings.

The essential basis of the decision was that the word "establishes" connotes a degree of proof beyond that which may be necessary to raise a reasonable doubt. The Court further held that placing such a burden upon the accused was not contrary to the presumption of innocence protected by the *Canadian Bill of Rights*. In *Appleby* the majority of the Court held in effect that the right to be presumed innocent until proved guilty according to law is not a right to be presumed innocent until proved guilty beyond a reasonable doubt. Laskin, J., in a special opinion concurring in the result arrived at by the other members of the Court, appeared to interpret the presumption of innocence in the *Canadian Bill of Rights* as including the right to the benefit of any reasonable doubt but then found that there was no conflict with this right in holding that it was insufficient for the accused who is faced with the statutory presumption of section 237 to raise a reasonable doubt. It should be noted that the United States Supreme Court has held that the right to the benefit of reasonable doubt is protected by the due process clause of the Constitution.⁸⁹ Due process is also affirmed in the *Canadian Bill of Rights*, and the specific reference to the presumption of innocence is only a particular aspect of it. Due process does not appear to have been argued in the *Appleby* case.

On the basis of due process and the rational connection test which has been applied to the constitutionality of criminal statutory presumptions in the United States,⁹⁰ it would be open to argue that the statutory presumption in the *Narcotic Control Act* is distinguishable from that in section 237 of the *Criminal Code*. It is reasonable to assume, however, that the conclusion of the Supreme Court in the *Appleby* case would be applied to the statutory burden of proof cast upon the accused in a prosecution for the offence of possession for the purpose of trafficking. The result of the case is that the burden is even heavier than we assumed when we expressed concern about it in the *Interim Report*. What it means is that the fact of intent to traffic is not to be governed by the ordinary rule concerning benefit of reasonable doubt. It is deemed to be proved beyond a reasonable doubt by proof of unauthorized possession, and it can only be negated by proof which carries on a balance of probabilities. If the evidence of the accused merely raises a reasonable doubt as to the intent to traffic he is not entitled to the benefit of that doubt.

In 1970 there were 399 convictions for possession for the purpose of trafficking under the *Narcotic Control Act*, of which 356 were for cannabis (Table A.1). In 1971 there were 602 such convictions of which 533 were for cannabis (Table A.2).

Simple Possession

For the purpose of the *Narcotic Control Act*, “possession” has the same meaning as it has under the *Criminal Code* where it is defined in section 3(4) as follows:

- (a) a person has anything in possession when he has it in his personal possession or knowingly
 - (i) has it in the actual possession or custody of another person, or
 - (ii) has it in any place, whether or not that place belongs to or is occupied by him, for the use or benefit of himself or another person; and
- (b) Where one of two or more persons, with the knowledge and consent of the rest, has anything in his custody or possession, it shall be deemed to be in the custody and possession of each and all of them.

It has been held that there is no “minimal” amount required to establish the offence of simple possession,⁹¹ but an “infinitesimal” amount found in traces in the accused’s clothing has been held insufficient for conviction.⁹² As in the case of possession for the purpose of trafficking the accused must be shown to have been in possession of a drug prohibited by the statute, and such proof is made in practice by an analyst’s certificate. The accused must know that he has a prohibited drug in his possession. In other words, he must have the necessary intention or *mens rea* traditionally required for criminal responsibility.⁹³ The burden is on the accused to prove any exception, exemption, excuse or qualification prescribed by law which operates in his favour—for example, that his possession is authorized by the Act or Regulations.⁹⁴ Where the accused is charged with being in constructive possession by virtue of the fact that another person has possession with his knowledge and consent, it is not sufficient to show mere acquiescence; it is necessary to show some kind of control⁹⁵ over a common venture regarding the drug.⁹⁶

In 1970 there were 5,657 convictions for the offence of simple possession under the *Narcotic Control Act*, of which 5,399 were for cannabis (Table A.1). In 1971 there were 8,840 such convictions, of which 8,389 were for cannabis (Table A.2). The details concerning sentences will be considered in the section of this Chapter on Sentencing Policy.

Cultivation

In 1970 there were 43 convictions for illegal cultivation of marijuana and 58 such convictions in 1971 (Tables A.1 and A.2).

The law makes no distinction between cultivation for purposes of trafficking and cultivation for one’s personal use, and we have not found any reported decisions reflecting this distinction. It should be observed, however, that the offence is cultivation, or the deliberate growing of cannabis plants, and not merely being in possession of them.

APPLICABLE PROVISIONS OF THE CRIMINAL CODE

Any matter concerning the offences created by the *Narcotic Control Act* and the *Food and Drugs Act*, which is not specially provided for in these statutes, is governed by the provisions of the *Criminal Code*⁹⁷ of Canada. These provisions relate to such matters as principles of criminal responsibility, parties to offences, attempts, conspiracies and accessories, jurisdiction and procedure. Basically, what the special statutes do is to define the offence and provide the penalty. They also touch such matters as statutory presumption and burden of proof, as well as special provisions concerning methods of law enforcement. For the rest, the *Criminal Code* applies.

Certain offences created by the *Criminal Code* have a direct bearing on the suppression of conduct related to non-medical drug use. Probably the most important of these is conspiracy,⁹⁸ to which it is generally necessary to resort in attempting to convict persons involved in trafficking at higher levels of organization. Since such persons are usually careful to have no direct contact with the substance in which the trafficking is being carried on, nor with the lower levels of the distribution system, it is rarely possible to discover them in the actual act of trafficking or of possession for the purpose of trafficking. Conspiracy is generally a difficult case to make, often involving considerable time and expense.

The offences of obtaining by false pretense,⁹⁹ forgery,¹⁰⁰ and uttering a forged document¹⁰¹ are sometimes invoked in connection with attempts to obtain drugs illegally. There are also several offences covering conduct which involves injury or the threat of injury to third persons as a result of the use of drugs. There is the offence of murder by administering a stupefying or overpowering thing for the purpose of facilitating the commission or an offence or facilitating flight after committing or attempting to commit an offence,¹⁰² the offence of administering a noxious thing,¹⁰³ the offence of overcoming resistance to an offence by the administration of a drug,¹⁰⁴ and the offences of administering a drug for the purpose of illicit intercourse¹⁰⁵ and procuring an abortion.¹⁰⁶ There is also the offence of driving a motor vehicle or having the care or control of it when the ability to drive is impaired by alcohol or any other drug.¹⁰⁷

It is a criminal offence to counsel, procure or incite another person to commit an offence,¹⁰⁸ and this provision is applicable like other provisions of the *Criminal Code* to drug offences.¹⁰⁹ If the offence is actually committed, the person who counsels or procures the other person becomes a party to the offence.¹¹⁰ There is the similar offence of aiding and abetting a person to commit an offence, which also makes the person who aids and abets a party to the offence.^{110a}

JUVENILE DELINQUENCY LEGISLATION

A violation of the drug laws is an act of juvenile delinquency under the *Juvenile Delinquents Act*,¹¹¹ which defines a "juvenile delinquent" as follows:

...any child who violates any provision of the *Criminal Code* or any federal or provincial statute, or any by-law or ordinance of any municipality, is guilty of sexual immorality or any similar form of vice, or who is liable by reason of any

other act to be committed to an industrial school or juvenile reformatory under any federal or provincial statute....

The age limit for the application of the *Juvenile Delinquents Act* varies among the provinces from under sixteen in some to under eighteen in others. Where a child is over the age of fourteen and he is alleged to have committed an indictable offence the case may be transferred or "waived" from the juvenile court to the ordinary criminal court.¹¹² Cases involving drug offences are transferred to the ordinary courts from time to time.¹¹³ Sometimes, however, the case is remitted to the juvenile court.¹¹⁴ The proposed *Young Offenders Act*¹¹⁵ makes similar provision for the transfer of a case from the juvenile court to the ordinary criminal court.

The statistics of juvenile cases are not kept in a manner which permits them to be used as a reliable basis for estimating the number of cases involving drug offences which come before the juvenile courts. We know that there is a significant number of juveniles who are treated as delinquents by reason of drug offences, but there is no statistical basis for a reasonable estimate of the number.

SPECIAL METHODS OF ENFORCEMENT

The peculiar nature of drug crimes—the fact that the people involved in them are consenting and co-operating parties, and there is rarely, if ever, a victim who has reason to complain, as in crimes against persons and property—makes enforcement of the drug laws very difficult. The police are rarely assisted by complainants. For the most part they have to make their own cases. Moreover, the activity involved in non-medical drug use is relatively easy to conceal. It can be carried on, by agreement of the parties involved, in places which are not easily observed by the police. Further, the substances and equipment involved are relatively easy to conceal or dispose of.

All of these difficulties have given rise to the development of unusual methods of enforcement. They are by no means confined in their application to the drug laws, but the combined effect of their use in connection with these laws has been one of the chief causes of concern about the impact of the criminal law in this field. The police admit the use of these methods in one degree or another, but they claim that they are absolutely essential to effective enforcement of the drug laws. Critics of these methods question their necessity but recognize the difficulty of challenging the professional opinion of the police on this point. Their chief contention is that these unusual methods represent a cost of enforcing the drug laws that is too great for the benefit derived from it. In particular, they say that the use of these methods has brought law enforcement into disrespect among young people, and has undermined respect for police and law generally. We shall comment on these issues in our conclusions and recommendations.

These unusual methods of enforcement are special powers of search and seizure, the use of force to effect entry to premises and to recover evidence, the use of undercover agents and informers, and the encouragement or provocation of drug offences.

Powers of Search and Seizure

Search of premises. Unless they have special statutory powers police can only search premises without a search warrant as an incident of arrest. Under the *Narcotic Control Act*¹¹⁶ and the *Food and Drugs Act*¹¹⁷ the police are empowered, without the necessity of a search warrant, to enter and search any place other than a dwelling-house in which they reasonably believe that there is a prohibited drug by means of or in respect of which an offence has been committed.

In order to be able to search a dwelling-house, other than as an incident of arrest, the police must obtain a search warrant from a justice, who must be satisfied upon an information under oath that there are reasonable grounds for believing that there is a prohibited drug by means of which an offence has been committed in the dwelling.¹¹⁸ The R.C.M. Police, however, may, and generally do, carry out such a search under the authority of a writ of assistance, which does not require them to establish such reasonable grounds for belief before a justice.

A writ of assistance is a general warrant that is not limited as to time or place and remains valid during the entire career of the law enforcement officer to whom it is issued. It is obtained upon application by the Minister of National Health and Welfare to a judge of the Federal Court.¹¹⁹ The judge has no discretion in the matter. It is mandatory that he issue the writ upon such an application. The writ empowers the officer named in it, with the assistance of such other persons as he may require, to enter any dwelling-house at any time and search for prohibited drugs. In practice writs of assistance are issued under the drug laws only to officers of the R.C.M. Police.

In acting under a writ of assistance a police officer must reasonably believe that the dwelling-house contains a prohibited drug by means of or in respect of which an offence has been committed, but the grounds for his belief are not, as in the case of a search warrant, subject to review by a justice before he uses the writ. Officers who hold these writs are obliged, however, by the R.C.M. Police regulations to report on the use which they make of them, and they are subject to disciplinary measures for any apparent abuse of them.¹²⁰

The chief distinction between the search warrant and the writ of assistance is the convenience of the latter. It avoids what may in many cases be a crucial loss of time. In stressing the necessity of the writ of assistance the R.C.M. Police have stated that the conditions under which searches have to be carried out under the drug laws make it very difficult in practice to obtain search warrants. They have emphasized the mobility of drug offenders, the fact that they often do not have an identified address, and the fact that searches have to be carried out very often at night when it is difficult to obtain a warrant.

Other police claim to be at a disadvantage for lack of the writ of assistance, and this is one of the reasons they have often preferred to act with the R.C.M. Police.

Search of the person. As a general rule police only have the power to search the person as an incident of arrest, in order to discover anything which might serve as evidence of the crime for which the arrest is made, or to disarm the

person arrested. Under the *Narcotic Control Act*¹²¹ and the *Food and Drugs Act*¹²² the police are empowered, when searching any dwelling-house or other place, to search any person found therein. They are not obliged to make an arrest in order to carry out a search of the person.

Seizure. At common law a police officer has the power to seize anything uncovered in the course of a search of premises which may be evidence of the crime for which a person is arrested. When acting under a search warrant he is expressly authorized to seize and bring the thing for which the warrant has been issued before a justice. Under the *Narcotic Control Act*¹²³ and the *Food and Drugs Act*¹²⁴ there is an express power given to a police officer, when searching any dwelling-house or other place, to seize and take away any prohibited drug found in such place, anything in which he reasonably suspects such a drug to be contained or concealed, or any other thing by means of or in respect of which he reasonably believes an offence under the Act has been committed or that may be evidence of such an offence. This would include any motor vehicle by means of which an offence has been committed. The Act provides for forfeiture of things seized in the event of conviction. A person who has an interest in a motor vehicle which was seized but who was not in possession of it when it was seized or in any way responsible for its use to commit an offence may have his interest declared by a court. The vehicle is then returned to him or an amount equal to the value of his interest paid to him.¹²⁵

The Use of Force

The Acts provide that in carrying out a search a police officer may, with such assistance as he deems necessary, break open any door, window, lock, fastener, floor, wall, ceiling, compartment, plumbing fixture, box, container or any other thing.¹²⁶

The courts have also recognized that a police officer may use reasonable force upon the person to recover the prohibited substance. This is really an incident of the right to search the person. Such force is sometimes used to prevent heroin users from swallowing a supply of the drug which they have concealed in their mouth. In *R. v. Brezack*¹²⁷ the Ontario Court of Appeal affirmed the legality of this practice and said:

...it is well known that, in making arrests in these narcotic cases, it would often be impossible to find evidence of the offence upon the person arrested if he had the slightest suspicion that he might be searched. Constables have a task of great difficulty in their efforts to check the illegal traffic in opium and other prohibited drugs. Those who carry on the traffic are cunning, crafty and unscrupulous almost beyond belief. While, therefore, it is important that constables should be instructed that there are limits upon their right of search, including search of the person, they are not to be encumbered by technicalities in handling the situations with which they often have to deal in narcotic cases, which permit them little time for deliberation and require the stern exercise of such rights of search as they possess.

The use of force by a policeman in an illegal search is an assault, and a

person has a right under the *Criminal Code* to use such force as is necessary to resist such assault.¹²⁸

The Use of Undercover Agents and Informers

Because of the difficulty of detecting drug crimes the police rely heavily on undercover agents and informers. Undercover agents may have to engage in drug transactions in order to establish an identity or gain acceptance in the drug milieu. For this purpose they may purchase drugs in what the police call a "non-evidence buy", as distinct from a purchase to establish evidence against an offender. The R.C.M. Police and other police pay persons to give them information concerning drug offences or persuade them to give such information in return for enforcement concessions. This is considered to be a legitimate law enforcement practice. Since the police rarely receive complaints they are very dependent upon information obtained in this way. As one R.C.M. Police officer put it to a Commission investigator: "Information is our business." Individual officers spend a great deal of time developing their sources of information.

During the course of our inquiry there were public complaints that young people were being recruited by the police as informers. In some cases the police were accused of using the threat of prosecution to induce youths to act as informers. It has not been possible to verify the facts of these cases in a manner that would support specific charges, but the official position of the R.C.M. Police is that they do not approve of such practices.

The police claim that the use of undercover agents and informers not only assists in the detection of drug offences but helps to control drug availability by making it more hazardous to engage in trafficking.

Police Encouragement or Instigation of Offences

Undercover agents have engaged in a practice which has been disavowed by officials but which, if we are to judge from reported decisions, continues to be used. This is the practice of inducing a person to commit a violation of the drug laws. This is often referred to as acting as an *agent provocateur*. In the United States the practice is called "entrapment".

A common example is for an undercover agent to ask a person to sell or give him a prohibited drug. There were frequent complaints of this practice in the course of our public hearings although it was not possible to conduct the kind of full judicial inquiry that would be necessary to verify the facts in particular cases. The reported decisions, however, contain several examples of cases in which this practice has been used.¹²⁹

A distinction must be drawn between offering the occasion for the commission of a crime to a person who has already formed the intention of committing it, and inciting a person who has not yet formed such an intention to commit a crime in order to have the basis for prosecution against him. It is our impression from our inquiry that law enforcement officials at the senior level do not attempt to justify the second kind of case. They contend however, that the usual case is one in which an undercover agent buys from a person who is more than willing to sell.

As indicated in the section of this Chapter entitled Applicable Provisions of the *Criminal Code*, counselling and aiding and abetting a person to commit a criminal offence are themselves criminal offences. Apart from special statutory provision, law enforcement officers have no immunity from criminal liability on the ground of "public duty" for offences committed in the course of their functions.¹³⁰ The extent, however, to which they may be held liable in practice is not clear.¹³¹ A court may take the view that when doing something for law enforcement purposes which would otherwise be an offence they do not have the necessary criminal intent for liability.

Police encouragement or instigation has not been recognized as a defence to a criminal charge in Canadian law.¹³² There is some precedent for ordering a stay of prosecution in such circumstances on the ground of an abuse of process, but a serious doubt has been raised as to whether this is a valid approach.¹³³ Courts have, however, treated police provocation as ground for mitigation of sentence.¹³⁴

The American courts have developed the defence of "entrapment" as a basis for acquittal where the intention to commit the offence has been implanted by law enforcement officials.¹³⁵ The Canadian Committee on Corrections recommended the legislative adoption of a similar defence in Canada in favour of a person who does not have "a pre-existing intention to commit the offence."

DISCRETION EXERCISED BY POLICE AND PROSECUTORS

The Commission has attempted by certain kinds of investigation to develop an understanding of how discretion is exercised at the different stages of the criminal law process in the application of the drug laws. The material from which it draws its conclusions consists of the statistics concerning prosecution and disposition of drug cases in recent years, interviews with police and participant observation of the manner in which they enforce the law, interviews with prosecutors and defense counsel, and interviews with judges. The purpose of this study has been to determine the attitudes of police, prosecutors and judges, how they see the nature and the difficulties of their task, and the manner in which they appear to be exercising the discretion that is open to them.

The state of government statistics on these matters leaves a great deal to be desired. They are particularly weak as a basis for attempting to identify the essential characteristics of the kinds of individuals, with respect to each drug, who are being put through the criminal law process. The basic problem is the incompleteness of the information on these points, particularly the relatively large number in the "not stated" category.

There is still not an adequate statistical basis for a flow chart such as that which we included in Chapter Five of the *Interim Report*. In particular, we do not have reliable statistics to indicate the number of reports of alleged violations of the drug laws, in the different categories, which are brought to the attention of the police, the manner in which they are dealt with, and, in particular, the proportion in which there is a prosecution. How many cases known to the police are dealt with by warning or some other kind of

intervention which does not involve the laying of a charge? We do not know. There is more data available for the various stages of the criminal law process, but here we encounter problems of incompleteness and inaccuracy in compilation.

The primary responsibility for enforcement of the drug laws in Canada has rested since 1920 with the R.C.M. Police. They work in close co-operation with the law enforcement authorities of other countries and with the International Criminal Police Organization (INTERPOL). They also work in close association with municipal police forces and to some extent with provincial police forces in provinces in which they do not act, under contract, as the provincial police. In the last year or two there has been a definite shift in emphasis in the distribution of responsibility between the R.C.M. Police and other police forces for enforcement of the drug laws. The R.C.M. Police have tended to concentrate increasingly on the enforcement of the laws against trafficking and to leave the main effort of enforcement against simple possession to the local police forces. At least, this is the pattern that is strongly suggested by the study that we have been able to make of the situation, and it is not denied by the R.C.M. Police. They do not have the manpower to give enforcement against trafficking the priority it requires and to make a serious effort against simple possession as well. Even the local police lack the necessary resources, and most of the cases of simple possession are discovered accidentally in the course of other law enforcement activity.

The prosecutions in federal drug cases are conducted by prosecutors appointed by the Attorney General of Canada. This is a long-established practice which operates by tacit agreement with the provinces. The Federal Government assumes responsibility for the prosecution in criminal matters governed primarily by special federal statutes rather than by the *Criminal Code*. In such matters, however, federal prosecutors conduct the cases, even where provisions of the *Criminal Code* may be involved, as, for example, in a case of conspiracy to traffic.

Provincial acquiescence in this federal role in the administration of criminal justice (which, apart from legislation with respect to procedure in criminal matters, falls within provincial jurisdiction) is explained by several factors: first, and foremost, the primary responsibility for law enforcement in these areas which has been assumed by the R.C.M. Police; the specialized expertise which the federal prosecutors have developed in these areas; and finally, the fact that the provincial law enforcement authorities have more than enough to look after with their primary responsibility for the application of the *Criminal Code* and provincial statutes of a penal nature. In any event, the federal assumption of responsibility for prosecution in these special areas of the criminal law has never been seriously challenged. The province could undertake prosecutions in these areas, but even where provincial or municipal police forces initiate drug cases, their policy is to refer them to the federal prosecutors. Although there is evidence of a shift in responsibility for the offence of simple possession from the R.C.M. Police to the municipal police forces, there is not a corresponding shift in the responsibility for prosecution.

To provide for the necessary legal services in these special areas of the

criminal law and in the civil cases in which the federal Crown must be represented, the federal Department of Justice maintains regional offices in the cities of Montreal, Toronto, Edmonton, Winnipeg and Vancouver. In areas which cannot be served under these offices standing agents are appointed by the Department where the volume of business warrants it. In other cases, ad hoc appointments are made.

By means of policy directives from Ottawa and the organization of the regional offices an effort is made to ensure a measure of consistency and uniformity in prosecution. The office in Ottawa exercises a general control with respect to the discretion that is open to prosecutors, and the directors of the Regional Offices exercise a close control over daily operations. The main objective of the regional offices is to dispatch an increasing case load as efficiently as possible. The federal prosecutors have, generally speaking, acquired a good reputation for professional standards and fairness. They have tried to deal in an even-handed way in a controversial field of law where there is a strong body of opinion opposed to certain aspects of the law and its enforcement. Because of the very controversial nature of their work, the approach of the prosecutors to the exercise of discretion is a cautious one. They are very conscious of the possible abuse of discretion.

Another important consideration affecting the exercise of discretion by federal prosecutors in the drug field is the dominant role played by the police, and particularly the R.C.M. Police, in the initiation and direction of cases. The federal prosecutors work very closely with the police in these cases, and make few decisions without their approval.

The decision as to whether a charge should be laid. This is a decision as to whether there is to be a prosecution at all, and as to the nature of the charge on which it is to be based. Outside the Montreal region, this decision is usually taken by the police without prior consultation with the prosecutors, but in the Montreal region it is customary for the police to consult the prosecutors first. The difference in practice is thought to be due to the difference in the volume of cases which has to be handled in the different regional offices. Looking at drug prosecutions in Canada as a whole, it may be said that the police play the dominant role in the decision as to whether to prosecute and as to the charge to be laid. However, prosecutors have an opportunity to review the appropriateness of the charge after it has been laid and to correct any errors which may have been made. They may withdraw a case if they are of the opinion that there is not sufficient evidence to support it. Withdrawal of a charge is a decision over which regional directors exercise close supervision.

The decision as to whether to proceed by indictment or summary conviction. The distinction between indictable offences and summary offences is basically one of relative seriousness, which is reflected in the range of penalties. When the Crown is given the option to proceed by indictment or summary conviction it is really given the option to decide how seriously it wishes to treat the offence. An important consequence of the distinction between indictable offences and summary offences is that the *Identification of Criminals Act*, which provides for fingerprinting and photographing and the keeping of such records in a central registry, applies to persons accused or convicted of

indictable offences.¹³⁶ Federal legislation which provides for the option has been held by the Supreme Court of Canada not to be in violation of the right to equality before the law which is affirmed by the *Canadian Bill of Rights*.¹³⁷

The option has existed since August 1969 in cases of simple possession under the *Narcotic Control Act*, and it exists in all cases under Parts III and IV of the *Food and Drugs Act*, but the discretion of prosecutors with respect to it is circumscribed by policy directive from senior officials of the Department of Justice in Ottawa. In July 1969, when Bill S-15 creating this option was pending, the Department issued the following "general rules" to determine how it should be applied in cases of simple possession:

- 1) Cannabis, controlled drugs, restricted drugs.
 - (a) first or second offence, summary conviction;
 - (b) third or subsequent offence, indictment.
- 2) Hard drugs (i.e. drugs other than cannabis, controlled or restricted drugs).
 - (a) first offence, summary conviction;
 - (b) second or subsequent offence, indictment.
- 3) Hard drugs after conviction relating to cannabis, controlled or restricted drugs, indictment.
- 4) Cannabis, controlled or restricted drugs, after conviction relating to hard drugs, indictment.
- 5) Charges including both hard drugs and cannabis, controlled or restricted drugs, first offence, summary conviction.
- 6) Indictment in any case that would otherwise be time-barred.

The directive pointed out that these were general instructions only; that provision would be made for exceptional cases; but that consistency and uniformity of enforcement would be ensured by prior consultation with designated officials in Ottawa. The chief cases in which discretion to depart from these rules has been exercised is where the accused has a previous criminal record. In practice, the prosecutors in the main metropolitan areas have been permitted, because of their experience, to exercise discretion in exceptional cases without consultation with the departmental officials in Ottawa.

Other areas in which prosecutors exercise discretion are the scheduling of cases, representations as to bail, reduction of charges or counts in exchange for a plea of guilty and negotiations and representations as to sentences. It is more difficult to generalize about the practice on these matters since there appears to be considerable variation. In several of these areas of discretion, as in others, the police appear to play a very influential role.

SENTENCING POLICY

General. Sentencing practices in drug cases are characterized by a wide disparity across Canada. Not only is this clear from reported decisions, but it is conclusively demonstrated by answers to questions which were put to judges in research conducted for the Commission. The purpose of this research was to determine judicial perceptions of the drug phenomenon.

In the summer of 1970 approximately seventy judges were interviewed¹³⁸

following a standardized interview guide which was derived out of a number of pilot interviews held with judges in Ontario. The interviews lasted from between one and one-half to two and one-half hours. Only a few judges among those who were contacted refused to be interviewed. The population from which the sample was drawn consisted of all judges who had dealt with a significant number of drug cases within the past two years at both the trial and appellate levels. Random sampling techniques were not deemed necessary nor practical as it was possible to identify in each judicial division those judges who have had some experience in drug cases. The judges omitted from the sample included those who dealt with less than five drug cases (if suitable replacements were available) and those who were away on holiday or otherwise unavailable during the time in which the interviews were conducted.

The judges were asked to rank the following problems in order of relative seriousness: threat of war, unemployment, student unrest, pollution, drug abuse, housing shortage, sexual immorality, juvenile delinquency, marital breakdown, and organized crime. There was great variation in their answers but based on the mean response to each problem, the order of relative seriousness (from most serious to least serious) in which the judges ranked these problems was: 1. drug abuse; 2. organized crime; 3. juvenile delinquency; 4. unemployment; 5. marital breakdown; 6. pollution; 7. housing shortage; 8. student unrest; 9. sexual immorality; 10. threat of war.

Each judge was asked to rank twenty criminal offences, including six drug offences in order of relative seriousness. Again there was great variation in the answers but on the basis of mean response, the twenty crimes were ranked in order of seriousness (from most serious to least serious) as follows: 1. trafficking in heroin; 2. armed robbery; 3. trafficking in LSD; 4. breaking and entering; 5. trafficking in marijuana; 6. possession of heroin; 7. assault causing bodily harm; 8. indecent assault; 9. procuring a female person; 10. theft over \$50; 11. false pretence over \$50; 12. possession of LSD; 13. dangerous driving; 14. gross indecency; 15. malicious damage; 16. possession of marijuana; 17. theft under \$50; 18. common assault; 19. causing disturbance; 20. vagrancy.

Three factors seem to distinguish punitive and non-punitive responses to interviews. The first is one of social distance between the judge and the drug offender coming before him. Judges and magistrates with strong links in the community and some understanding of the social circumstances of drug users arising from personal contacts with street level agencies tend to take a more tolerant view of drug use which is reflected in the sentencing behaviour. This may help to explain the data which show a sharp difference between appeal and trial judges in sentencing philosophy. Most appeal judges tend to support a deterrent philosophy and are somewhat more punitive in their general outlook. In some provinces a real struggle appears to have been taking place between trial and appeal judges. Crown appeals from sentences have generally been upheld in these provinces.¹³⁹ It is clear that appeal judges in most provinces have felt it necessary to lay down rather stern sentencing guidelines in drug cases. Appeal judges are much more isolated from the drug offender and social circumstances than lower court judges. Moreover, their experience

tends to be based on a biased sample of cases coming before the courts. They tend to see the more serious cases.

The second factor relates to the nature and extent of previous experience in the criminal law field. Any kind of experience at the criminal bar was associated with a more lenient sentencing policy. It was interesting to note that judges who had previously acted as Crown attorneys tended to be more lenient than judges with no previous criminal law experience whatsoever. Among judges with some previous experience at the criminal bar, however, those who acted primarily as defence counsel were more lenient than those who had acted primarily as Crown attorneys.

The third factor relates to the length of exposure to drug cases as a judge. The data show an apparent progression from punitive to less punitive behaviour as the judge becomes more familiar with drug cases. Moreover, it is noticeable that the sophistication of sentences tends to increase as experience builds up.

Judges were asked in what circumstances they would choose a fine in sentencing an offender. They suggested fines most frequently where the offender had no previous record. It was mentioned almost as often that fines were limited to possession cases. Other important considerations were the youth of the offender, whether "soft" drugs were used, and whether or not the offender could pay the fine himself.

Probation was recommended most often for an offender who needs supervision or for a first offender. Also mentioned frequently were cases of simple possession and cases where soft drugs were involved, counselling was needed, or the offender was a student or employed. Also mentioned were cases where the offender is unlikely to repeat or has a family commitment.

Imprisonment in a provincial institution (a sentence of less than two years) was recommended most often in cases where trafficking was involved or the offender had a previous record. Judges also mentioned frequently that they were forced to give a prison sentence because of a court of appeal decision relevant to the case. Prison was also suggested for hard drug cases or cases where others were harmed. It would appear from the judges' responses that general deterrence is most often the objective in sentencing an offender to the penitentiary (a sentence of two years or more).

Judges were asked what three pieces of information they would like to know about the offender when sentencing in a drug case. These were listed in order of importance. Criminal record appeared most often as a first choice. Family record was mentioned most often as a second and third choice. Employment and school records were also chosen frequently as second choice. Information concerning religious affiliation, church attendance and friends and associates appeared as third choice.

The majority of judges asked for a pre-sentence report, at least most of the time, and a majority found them helpful.

The practice differs in various jurisdictions as to whether judges expect Crown counsel to speak to sentence. It is thought by some judges to be a

usurpation of the judicial function; by others it is thought to be the duty of the Crown.

Each judge was also asked whether he requested recommendations from probation officers as to sentence in drug cases. Thirteen answered by an unqualified yes. Seventeen stated that they did but that they only received recommendations as to probation. Twenty-two replied in the negative. Most of the judges considered the probation officers' recommendations at least "somewhat helpful". Twenty-one judges gave no answer to this question.

Fifteen hypothetical cases were put to the judges and magistrates to determine the sentences they would give. The answers revealed a very great disparity in sentencing. The range of sentences in each case is shown in Table 6. The total amount of imprisonment given for all the cases combined ran from a low of four years to a high of 47 years. Sophistication in judicial response increased with the experience of the judge. Complex combination sentences—for example, fines plus probation, institution plus probation—tended to be characteristic of the experienced judges.

The scale of seriousness attached to the case depended primarily on the type of drug concerned and whether the case was one of trafficking or simple possession. Drugs tended to be rated from highest to lowest in the following order: heroin, amphetamines, LSD and other hallucinogens, hashish and marijuana. Judges operating with a simple set of rules tended to make a rigid distinction between trafficking and possession. More experienced judges would draw distinctions among trafficking cases depending upon the amount of the drug, the relationship between seller and purchaser, and the motive for sale. An important secondary factor concerned the existence and length of a previous criminal record. It appeared that the record was always considered but only after an assessment had been made of the current offence. Some judges tended to minimize the significance of a record, feeling that it was their task simply to sentence for the current offence.

Sentences in cases of simple possession of cannabis. The statistics for the years 1967 to 1971 inclusive show a marked change in the judicial policy with respect to simple possession of cannabis, which began as one of severity in the interests of general deterrence. The courts held that severity with respect to simple possession was necessary in order to discourage the development of an illegal market. "If use of this drug is not stopped," said the British Columbia Court of Appeal, "it is going to be followed by an organized marketing system."¹⁴⁰

The most striking fact that emerges from the statistics is the increased use of fines. In 1967 and 1968, one per cent of all dispositions were fines. This increased in 1969 to 17.6%, in 1970, to 68.2%, and in 1971 to 77%.

There has been a corresponding decrease in the use of imprisonment. In 1967, 46% of those convicted were sentenced to imprisonment; in 1968 - 46.3%; in 1969 - 33.9%; in 1970 - 10%; and in 1971 - 7%.

In 1970, a total of 544 persons were imprisoned for the offence of simple possession of cannabis (Table A.3). Over 75% of the sentences were for less than six months and over 93% were under two years. A note on the statistics for 1970 released by the Division of Narcotic Control [now the Bureau of

Dangerous Drugs], of the Department of National Health and Welfare reads as follows:

In the great majority of the above cases where a term of imprisonment was imposed, other facts were involved, such as: A. a sentence was concurrent with an offence and sentence under the Criminal Code or an offence and sentence for a drug conviction relating to trafficking, possession for the purpose of trafficking or possession; B. a previous criminal record; C. a previous history of drug abuse; D. a previous drug conviction relating to trafficking, possession for the purpose of trafficking or possession; and E. a combination of two or more of the above factors.

In 1971, a total of 570 persons were imprisoned for the offence of simple possession of cannabis (Table A.4). Over 80% of the sentences were for less than six months and over 97% were under two years.

Hypothetical cases 1, 5, 6 and 11 were for simple possession of marijuana. (See Table 6.) Case 1 involved a 17-year-old male with a criminal record; case 5 a 26-year-old married man with no criminal record; case 6 a 26-year-old single man with a previous conviction for simple possession of cannabis; and case 11 a 17-year-old male with no criminal record. Even in the cases where there was no previous record there were some judges who would have imposed imprisonment.

Sentences in the case of trafficking and possession for the purpose of trafficking. Government statistics do not permit an analysis of sentences in cases of trafficking and possession for the purpose of trafficking in cannabis prior to 1970. During those years no distinction was made in the presentation of the statistics between cases involving cannabis and those involving other drugs under the *Narcotic Control Act*.

Of 436 convictions for trafficking in cannabis in 1970 (Table A.5), 102 were disposed of by fine, suspended sentence or probation, and 343 by terms of imprisonment ranging from under six months to between five and six years. Over 90% of the prison sentences were for periods of less than two years. The figures for 1971 (Table A.6) show a similar distribution of sentences: 110 cases disposed of by fine, probation or suspended sentences, and 366 by imprisonment for periods from under six months to between five and six years, with 341 or 93% of the cases under two years.

Of the 356 convictions for possession for the purpose of trafficking in 1970 (Table A.7), 82 were disposed of by fine, suspended sentence or probation and 274 by terms of imprisonment ranging from under six months to between five and six years. About 90% of the prison sentences were for periods under two years. The figures for 1971 (Table A.8) show a similar distribution of sentences: 116 cases disposed of by fine, probation or suspended sentence and 417 by imprisonment for periods from under six months to between five and six years, with 366 or 88% of the cases of imprisonment under two years.

Hypothetical cases 2, 4 and 10 were for trafficking in marijuana. (See Table 6.) In all of these cases sentences of imprisonment predominated, with most judges choosing either six months or less, or between 12 and 18 months. There were, however, a significant number who chose a penitentiary sentence of two years or more.

TABLE 6
RANGE OF DISPOSITIONS IN FIFTEEN HYPOTHETICAL CASES

Case	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fine	9	6	-	2	34	18	2	2	8	5	15	-	2	-	3
Suspended sentence	4	2	-	-	8	4	10	3	7	1	12	-	3	-	1
Probation	15	12	-	2	22	3	24	4	25	5	37	4	17	-	3
Jail	21	29	5	28	3	29	12	24	12	30	1	23	16	6	16
Reform	11	6	2	13	-	6	4	8	6	10	-	24	9	2	13
Penitentiary	1	8	59	18	-	3	4	18	-	10	-	10	7	56	24
Probation + Jail	4	4	-	4	1	4	7	4	6	6	1	6	9	2	5
Additional facts	3	1	-	1	-	1	3	5	1	1	1	-	1	-	-
Not answered	1	1	3	1	1	2	3	1	4	1	2	2	5	3	4

There does not appear to be any consistent pattern in the cases reflecting significant differences in kinds of trafficking. At one time the courts attempted to single out a certain kind of trafficker for special treatment,¹⁴¹ but later abandoned the attempt.¹⁴² There are still cases of marginal trafficking which are treated with relative severity.¹⁴³

Sentences in cases of importing or exporting. Reference has been made to the implications of the mandatory sentence of seven years' imprisonment for this offence. In 1970, the sentences for this offence in cannabis cases were all between seven and eight years (Table A.9). In 1971, 16 of them were in this range and six fell into the category of 10 years and over (Table A.10).

Sentences in cases of cultivation. In 1970, there were a total of 43 cases involving cultivation of cannabis. Twenty-seven of the cases were disposed of by fine, probation or suspended sentence, and the balance by imprisonment for periods of under six months to under three years, with the majority under six months (Table A.11). In 1971, there were 58 cases, of which 35 were disposed of by fine, probation or suspended sentence and the balance by imprisonment for periods of under six months to under four years. Almost all of them were under six months (Table A.12).

Erratum: Page 253

Reference 4 should read: 4. India and Pakistan made such a reservation.

REFERENCES

1. The *Single Convention on Narcotic Drugs* was developed by the Commission on Narcotic Drugs pursuant to a direction from the Economic and Social Council in 1958. It was adopted and opened for signature in March 1961 at a United Nations plenipotentiary conference in which seventy-three states participated. Its general purpose was to replace the existing multi-national treaties in the field by a single system which would limit narcotic drugs to medical and scientific use. It came into force on December 13, 1964.
2. The *Convention on Psychotropic Substances*, 1971, was approved as a basis for international agreement at a plenipotentiary conference at which more than seventy states were represented in Vienna in February, 1971. Canada participated in the preparation of the Convention but, along with many other states, reserved her decision as to whether to become a party to it. States may become parties to the Convention by signing it, by ratifying it after signing it subject to ratification, or by acceding to it. The Convention was open for signature until January 1, 1972 and thereafter a state may become a party by accession.
3. Article 28, paragraph 3.
4. India made such a reservation on behalf of the protectorate of Sikkim.
5. Article 7.
6. Section 91(27) of the Canadian Constitution (the "*British North America Act*" which is usually referred to as the "*BNA Act*") confers exclusive jurisdiction upon the Parliament of Canada to make laws in relation to matters falling within the class of subjects described as "The Criminal Law, except the Constitution of Courts of Criminal Jurisdiction, but including the Procedure in Criminal Matters."
7. *Standard Sausage Co. v. Lee* [1934] 1 D.L.R. 706, [1933] 4 D.L.R. 501. See also *Rex v. Perfection Creameries Ltd.* [1939] 3 D.L.R. 185, affirming the validity on the basis of the federal criminal law power, of the prohibition against adulteration of butter in the federal *Dairy Industry Act*.
8. Revised Statutes of Canada 1970, Chap. F-27. Part III of the *Food and Drugs Act* prohibits trafficking and possession for the purpose of trafficking in "controlled" drugs (barbiturates and amphetamines) and Part IV prohibits trafficking, possession for the purpose of trafficking and unauthorized simple possession of "restricted" drugs (LSD, and other strong hallucinogens—DET, DMT, STP(DOM), MDA, MMDA, and LBJ).
9. Revised Statutes of Canada 1970, Chap. N-1.
10. [1971] S.C.R. 5.
11. Section 91(2) of the *BNA Act* confers exclusive jurisdiction upon the Parliament of Canada to legislate in relation to matters which fall within the class of subjects described as "The Regulation of Trade and Commerce". As we shall see, the apparently unlimited scope of these words has been cut down by judicial interpretation, so that jurisdiction with respect to this subject is divided between the federal and provincial legislatures.
12. Section 91 of the *BNA Act* confers on the federal Parliament exclusive jurisdiction to make laws for the "Peace, Order and Good Government" of Canada in relation to matters not assigned to exclusive provincial jurisdiction. This is generally referred to as the "Peace, Order and Good Government"

clause or the general power of Parliament. And then “for greater certainty but not so as to restrict the Generality of the foregoing”, it explicitly provides that exclusive federal legislative jurisdiction shall extend to all matters coming within the classes of subjects specified in an enumerated list. The numbered paragraphs in this list are usually referred to as subsections of section 91 or as “heads” of jurisdiction. Section 92 confers exclusive jurisdiction upon the provinces to make laws in relation to matters falling within the classes of subjects specified in an enumerated list. It does not contain an introductory or general grant of power in terms comparable to those of section 91, but head 16—“Generally all Matters of a merely local or private Nature in the Province”—is often referred to as the provincial residuary power.

13. *Reference re Natural Products Marketing Act* [1936] S.C.R. 398, aff’d by [1937] A.C. 377.
14. *The Queen v. Klassen*, (1959) 20 D.R.R. (2d) 406.
15. *In re Regulation and Control of Aeronautics in Canada* [1932] A.C. 54; *Johannesson v. West St. Paul*, [1952] S.C.R. 292.
16. *In re Regulation and Control of Radio Communication*, [1932] A.C. 54. The full scope of federal jurisdiction with respect to radio and television is presently a matter of some controversy.
17. *Pronto Uranium Mines Ltd. and Algom Uranium Mines Ltd. v. Ontario Labour Relations Board* [1956] O.R. 862.
18. *Munro v. National Capital Commission*, [1966] S.C.R. 663.
19. *Fort Frances Pulp & Power Co. Ltd. v. Manitoba Free Press Co. Ltd.*, [1923] A.C. 695; *Co-operative Committee on Japanese Canadians v. A.-G. Can.*, [1947] A.C. 87; *Reference re Validity of Wartime Leasehold Regulations*, [1950] S.C.R. 124.
20. *Toronto Electric Commissioners v. Snider*, [1925] A.C. 396.
21. *A.-G. Can. v. A.-G. Ont. (Labour Conventions case)*, [1937] A.C. 326.
22. *A.-B.C. v. A.-G. Can. (Natural Products Marketing Reference)* [1937] A.C. 377.
23. *Board of Commerce case*, (1922) 1 A.C. 191.
24. (1882), 7 App. Cas. 829
25. *A.-G. Ont. v. Canada Temperance Federation* [1946] A.C. 193.
26. (1883), 9 App. Cas. 117.
27. The decision concerned the validity of the federal *Liquor License Act, 1883* (46 Vic. c. 30, as amended by 47 Vic. c. 32). The decision of the Supreme Court of Canada is set out in the Schedule to 48–49 Vic. c. 74. Four of the five judges held that the Act was *ultra vires* except insofar as it related to vessel licenses and wholesale licenses—that is, licenses which were not of a retail nature within the provinces. The fifth judge held that the Act was *ultra vires* in whole. The decision of the Privy Council holding the Act *ultra vires* is referred to in several subsequent decisions, including the following: *A.-G. Can. v. A.-G. Alta. and A.-G. B.C.* [1916] 1 A.C. 588, per Viscount Haldane at pp. 595–597; *Board of Commerce case*, (1920), 60 S.C.R. 456 per Duff J., dissenting at pp. 494–497; *Toronto Electric Commissioners v. Snider* [1925] A.C. 396 per Viscount Haldane at pp. 410–413; *The Natural Products Marketing Reference* [1936] S.C.R. 398 per Duff C. J. at pp. 409–411.

28. *A.-G. Ont. v. A.-G. Can.*, [1896] A.C. 348 (usually referred to as the “Local Prohibition” case).
29. *Reference as to the Validity of Section 5(a) of the Dairy Industry Act*, (1949) S.C.R. 1, aff’d by [1951] A.C. 179.
30. Martin J. A. in *Standard Sausage Co. Ltd. v. Lee*, *supra*; Cross J., dissenting, in *Rinfret v. Pope* (1886) 12 Q.L.R. 303; Estey J. in *Reference re Validity of Section 5(a) of the Dairy Industry Act*, [1949] S.C.R. 1.
31. For example: *Rinfret v. Pope*, *supra*, in which the Quebec Court of Appeal held that public health legislation in each province, with the exception of the matters attributed to Parliament in section 92(11) of the BNA Act, fell within provincial jurisdiction; See also *Re Shelly*, (1913) 10 D.L.R. 666, holding regulations concerning the wrapping of bread to prevent the spread of infectious disease to fall within provincial jurisdiction.
32. See, for example, the following statement in the federal working paper, *Income, Security and Social Services*, which was presented to the fourth meeting of the Constitutional Conference on December 8, 1969: “Federal measures touching public health, such as pure food and drug enactments, represent a legitimate exercise of the criminal law power and, if necessary, the residuary power may be invoked to support federal legislation designed to cope with unusual hazards to public health. General legislative competence over health and welfare services, however, has been taken to reside at the provincial level.”
33. *Re George Bowack* (1892) 2 B.C.R. 216; *The Canadian Pacific Navigation Co. v. The City of Vancouver* (1892) 2 B.C.R. 193; *La Municipalité du Village St. Louis du Mile End v. La Cité de Montréal* (1885) 2 M.L.R. (S.C.) 218.
34. This was the assumption of the Rowell-Sirois Commission, and it was referred to without dissent in the working paper, *Income Security and Social Services*, *supra*. We have not been able to find any reported judicial decisions interpreting the scope of the word “quarantine” in section 91(11) of the BNA Act.
35. *Fawcett v. A.-G. Ont.*, [1964] S.C.R. 625, aff’d [1964] 2 O.R. 399. See also *R. v. Trapnell* (1910) 22 O.L.R. 219 (Ont. C.A.); *Green v. Livermore* [1940] 22 O.R. 381.
36. The Senate of Canada: Proceedings of the Special Committee on the Traffic in Narcotic Drugs in Canada, Queen’s Printer, 1955, xix.
37. *Criminal Code*, Part XXI. *Brusch v. The Queen* [1953] 1 S.C.R. 373; *R. v. Neil* [1957] S.C.R. 685.
38. See *Narcotic Addict Act* of New Brunswick, 1961–62 Stat N.B. c.25.
39. Section 543.
40. Section 542.
41. See *R. v. Trapnell* (1910), 22 O.L.R. 219 (Ont. C.A.), per Meredith J. A. at p. 222.
42. Laskin, *Canadian Constitutional Law*, Revised 3rd ed. 1969, p. 852.
43. Section 745.
44. *Goodyear Tire and Rubber Co. of Canada Ltd. et al. v. The Queen* [1956] S.C.R. 303.

45. *A.-G. B.C. v. Smith*, [1967] S.C.R. 702, upholding the validity of the *Juvenile Delinquents Act*, mainly on the ground that it was prevention of crime.
46. *Robinson v. California*, 370 U.S. 660.
47. Judicial decisions have affirmed the validity of the delegation by Parliament of administrative power to a provincial administrative authority, as distinct from the delegation of legislative power to the provincial legislature itself, which would be invalid. *P.E.I. Potato Marketing Board v. H.B. Willis Inc. and A.-G. Can.* [1952] 2 S.C.R. 392; *Coughlin v. Ontario Highway Transport Board* [1968] S.C.R. 569. The same principle would apply to delegation by a provincial legislature to a federal administrative authority.
48. *A.-G. Can. v. A.-G. Ont. (Labour Conventions case)*, [1937] A.C. 326.
49. In certain fields of activity, such as highway traffic, the courts have recognized the valid co-existence of somewhat similar or overlapping federal and provincial penal provisions. The federal provisions are enacted in virtue of the criminal law power, and the provincial provisions in virtue of provincial jurisdiction to regulate highway traffic. The courts would appear to be prepared to recognize the valid co-existence of virtually identical provisions so long as compliance with one does not involve violation of the other. See *Mann v. The Queen* [1966] S.C.R. 238.
50. See *Liquor Prohibition case*, *supra*; also *A.-G. Man. v. Manitoba Licence Holders' Association*, [1902] A.C. 73. See also *R. v. Nat Bell Liquors Ltd.*, [1922] 2 A.C. 128.
51. *Switzman v. Elbling and A.-G. Que.*, [1957] S.C.R. 285, at pp. 305-306, 324.
52. With reference to gambling: *Rex v. Lamontagne*, [1945] O.R. 606; *Johnson v. A.-G. Alta.* (1954) S.C.R. 127; *Deware v. The Queen*, [1954] S.C.R. 182; *Regent Vending Machines Ltd. v. Alberta Vending Machines Ltd. and A.-G. Alta.* (1956) 6 D.L.R. 548; with reference to censorship: *Regina v. Board of Cinema Censors of Quebec, ex parte Montreal Newsdealers Supply Co.* (1968), 69 D.L.R. (2d) 512; with reference to sexual morality: *Rex v. Hayduk*, [1938] O.R. 653. In most of these cases there was federal legislation touching the subject matter, but the weight of judicial opinion that flows from them is that the provinces do not have a jurisdiction to suppress conduct in the interest of public morality.
53. Cf. *Regina v. Snyder and Fletcher* (1967) 61 W.W.R. 112 and 576 (Alta. C.A.) and *Regina v. Simpson, Mack and Lewis* (1969) 1 D.L.R. (3rd) 597, [1969] 3 C.C.C. 101 (B.C.C.A.), in which the Courts of Appeal of Alberta and British Columbia came to different conclusions concerning the validity of provisions in the provincial Health Acts prohibiting the simple possession of LSD at a time when it was not prohibited by federal law. The Alberta provision was held to be valid as legislation in relation to a matter of public health, and the British Columbia provision was held to be invalid as legislation in relation to a matter of criminal law.
54. *Rex v. Osjorm* [1927] 2 W.W.R. 703 (Alta. C.A.)
55. For other cases in which, as in *Rex v. Osjorm*, the primary purpose of the legislation was held to fall within provincial jurisdiction although it could be said to be also advancing a notion of public morality: *Regina v. Wason* (1890), 17 O.A.R. 221 at 241-242; *Regina v. Fink* [1967] 2 O.R. 132 at 135-137.
56. Toronto: Thomas Allen, 1922.

57. *Ibid.*, p. 333.
58. 1923 Stat. Can., c. 22.
59. The Senate of Canada: Proceedings of the Special Committee on the Traffic in Narcotic Drugs in Canada, 1955, xii.
60. See, for example, House of Commons Debates, 1922, pp. 2824 and 3017.
61. As adopted by P.C. 1970-867, 12 May, 1970. SOR/70-205.
62. *Narcotic Control Regulations*, Section 46.
63. As amended by P.C. 1970-1910, 3 November, 1970. SOR/70-473. This part of the section reads as follows:

(3) Notwithstanding anything in these Regulations, a person under the professional treatment of a practitioner of medicine by reason of the use of a narcotic, or a controlled drug or a restricted drug within the meaning of the *Food and Drugs Act*, may give or deliver a narcotic that he has in his possession to that practitioner of medicine, and that practitioner of medicine shall forthwith

(a) for the purpose of identification or analysis, give or deliver the narcotic to a person authorized by the Minister under subsection (1) to be in possession of that narcotic, subject to the condition set out in the authorization, or

(b) deliver that narcotic to the Minister for his agent.

(4) A practitioner of medicine who has received a narcotic pursuant to subsection (3) shall be deemed to be in lawful possession of the narcotic.
64. Section 5.
65. Section 4(1).
66. Section 4(2).
67. Section 6.
68. Section 3.
69. Submissions of N.A. Chalmers and L-P Landry, Q.C., directors of regional offices, federal Department of Justice, at public hearing of Commission, Winnipeg, November, 1969. See also *R v. Bosley & Duarte* [1970] 1 C.C.C. 328 in which the Ontario Court of Appeal appears to have been influenced in raising a sentence for possession for the purpose of trafficking, by its opinion that the accused could have been convicted of importing if the Crown, in the exercise of its discretion, had not dropped that charge.
70. All statistics on convictions are furnished by the Chief, Division of Narcotic Control [now the Bureau of Dangerous Drugs] of the Department of National Health and Welfare.
71. Section 2. For a conviction for offering: *R. v. Chernecki*, 4 C.C.C. (2d) 556 (B.C.C.A.)
72. Section 4(1).
73. *R. v. MacDonald*; *R. v. Vickers* (1963), 43 W.W.R. 238, (B.C.C.A.). See also *R. v. Wells*, [1963] 2 C.C.C. 279, in which the accused was convicted of trafficking for her aid to a distributor who actually passed the drugs to the buyers. She drew up a list of potential buyers, received their money, and checked their names off the list as they received their purchase.
74. *R. v. Brown* (1953-54), 17 C.R. 257 (B.C.C.A.).
75. *R. v. Madigan*, [1970] 1 C.C.C. 354 (Ont. C.A.).

76. *R. v. MacDonald*; *R. v. Harrington and Scosky* (1964), 41 C.R. 75, 43 W.W.R. 337; [1964] 1 C.C.C. 189 (B.C.C.A.); *R. v. Cushman*, 5 C.R.N.S. 359 (B.C.C.A.); *R. v. Pappin*, 12 C.R.N.S. 287 (Ont. C.A.); Cf. *R. v. Young*, 2 C.C.C. 560 (B.C.C.A.), where transportation for the benefit of the accused, his wife, and a married couple who were friends was held to go beyond transportation for one's own use. The accused was convicted of possession for the purpose of trafficking.
77. *R. v. MacFadden*, [1971] 5 C.C.C. (2d) 204 (N.B.C.A.).
78. Section 9.
79. As to the necessity of signature on the certificate: *R. v. Richardson* (1969), 68 W.W.R. 501 (B.C.C.A.), *R. v. Blau* 10 C.R.N.S. 65 (B.C. Prov. Ct.); *R. v. Clark* (1969), 70 W.W.R. 399 (B.C.C.A.); as to accused's right to notice: *A.-G. Can. v. Ross*, 15 C.R.N.S. 71 (Que. C.A.); *R. v. Bellrose*, 15 C.R.N.S. 179; as to proof required of delivery to analyst: *R. v. Dawdy and Lamoureux*, [1971], 3 O.R. 282 (Ont. C.A.).
80. Section 8.
81. In Section 3.
82. See *R. v. Wilson* (1954), 11 W.W.R. 282 (B.C.C.A.), but compare with *R. v. Macdonald*, *R. v. Harrington and Scosky* (1963), 43 W.W.R. 337 (B.C.C.A.). Other circumstantial evidence most commonly relied on are exhibits suggesting sale or distribution, such as containers, scales and measuring spoons, lists of names and telephone numbers, large amounts of cash in small denominations, and the like; and evidence of the accused's movements suggestive of contact for purposes other than his regular employment.
83. See *R. v. Sharpe* [1961], O.W.N. 261, 131 C.C.C. 75 (Ont. C.A.) a case under the *Opium and Narcotic Drug Act*, the predecessor of the *Narcotic Control Act*.
84. Section 2(f).
85. [1968] 2 C.C.C. 183 (B.C.C.A.); See also *R. v. Cappello* 122 C.C.C. 342 (B.C.C.A.) and *R. v. Hupe, Forsyth and Patterson* 122 C.C.C. 346 (B.C.C.A.).
86. [1970] 3 C.C.C. 1 (B.C.C.A.).
87. 3 C.C.C. (2d) 354 (S.C.C.).
88. Formerly Section 224A(1).
89. *In re Winship*, 397 U.S. 358 (1970).
90. *Leary v. United States*, 395 U.S. 6 (1968) at p. 36: "...a criminal statutory presumption must be regarded as 'irrational' or 'arbitrary', and hence unconstitutional, unless it can at least be said with substantial assurance that the presumed fact is more likely than not to flow from the proved fact on which it is made to depend."
91. *R. v. McLeod* (1955), 21 C.R. 137 (B.C.C.A.).
92. *R. v. Ling* (1954), 19 C.R. 173; 109 C.C.C. 306 (Alta. S.C.); but compare *Regina v. Quigley* (1955), 20 C.R. 152; 111 C.C.C. 81 (Alta. C.A.), where it was held that the only reasonable conclusion was that the amount found was the residue of a larger amount.
93. *R. v. Beaver*, [1957] S.C.R. 531, 118 C.C.C. 129; *R. v. Peterson*, 1 C.C.C. (2d) 197 (Alta. C.A.). *R. v. Burgess*, [1970] 3 C.C.C. 268 (Ont. C.A.) where it was held that it is sufficient that the accused know that he is in possession of a

prohibited drug although he may not know which prohibited drug he has. See also *R. v. Blondin*, 2 C.C.C. (2d) 118 (B.C.C.A.), a case involving importing, in which it was held that there is sufficient *mens rea* if the accused is found to have “wilfully shut his eyes to what it was” if there can be inferred from this fact that he “suspected that it might be a narcotic”.

94. *Narcotic Control Act*, s. 7.
95. *R. v. Colvin and Gladhue* (1943), 1 D.L.R. 20, 78 C.C.C. 282 (B.C.C.A.) *R. v. Lavier*, 129 C.C.C. 297 (Sask. C.A.); *R. v. Harvey*, 7 C.R.N.S. 183 (N.B.C.A.); *R. v. Marshall* (1969), 3 C.C.C. 149 (Alta. C.A.); *R. v. Dick and Malley* (1969), 68 W.W.R. 437 (B.C.C.A.).
96. What is required is control over the drug but this may presumably be inferred from control over the person or persons in actual possession of it. But cf. *R. v. Bourne* (1970), 71 W.W.R. 385 (B.C.C.A.) following the judgement of Davey J. A. in *R. v. Bunyon*, 110 C.C.C. 119 (B.C.C.A.), that where there is not sufficient control to meet the test of joint possession under Section 3(4) (b) of the *Criminal Code*, the accused may be found guilty of having aided and abetted the offence of possession within the meaning of section 21(1) of the *Criminal Code*.
97. Revised Statutes of Canada, Chap. C-34.
98. Section 423.
99. Section 320.
100. Section 324.
101. Section 326.
102. Section 213.
103. Section 229.
104. Section 230.
105. Section 195.
106. Section 251.
107. Section 234.
108. Section 422.
109. See *R. v. McCloud and Georgia Straight Publishing Ltd.*, 12 C.R.N.S. 193 (B.C.C.A.), in which a newspaper was convicted of counselling persons to cultivate marijuana.
110. Section 22.
- 110a. Section 21.
111. Revised Statutes of Canada, Chap. J-3.
112. Section 9. For a discussion of the considerations governing the exercise of discretion to transfer a case of juvenile delinquency to the regular courts see Graham Parker, (1970) 48 *Can. Bar Rev.* 336.
113. See, for example, *R. v. Olafson* (1967), 68 W.W.R. 525 (B.C.C.A.), where it was held that a youth who was adjudged to be a juvenile delinquent by reason of unlawful possession of a prohibited drug and was transferred to the adult court and charged with unlawful possession under the *Narcotic Control Act*, could not raise the plea of *autrefois acquit*. See also *R. v. Gray* (1971) 3 W.W.R. (B.C.S.C.) where the defendant was accused of delinquency under the *Juvenile Delinquents Act* by reason of possession of marijuana. The Crown applied to

- have the defendant tried in the ordinary courts but that application was refused. The defendant then went before a juvenile court and pleaded guilty to the delinquency and was placed on probation. When he broke the terms of his probation he was once again brought before a juvenile court, whereupon the Crown applied, as before, that he be retried in the ordinary courts for the original delinquency, this time as an offence under the *Narcotic Control Act*. The juvenile court judge granted the application, and on appeal this was held to be a proper course under the *Juvenile Delinquents Act*. The court followed the *Olafson* decision.
114. See, for example, *R. v. Martin*, 9 C.R.N.S. 147 (Man. Q.B.), where a youth of sixteen, charged with trafficking in LSD, was ordered transferred from the juvenile court to the adult court, but the latter held that it was not in the interest of the juvenile or society to subject him to trial upon indictment in the adult court.
 115. Bill C-192.
 116. Section 10(1).
 117. Sections 37 and 45.
 118. *Narcotic Control Act*, s. 10(2).
 119. Section 10(3).
 120. Submission of R.C.M. Police to the Commission.
 121. Section 10(1)(b).
 122. Section 37(1)(a) and 45.
 123. Section 10(1)(c).
 124. Sections 37(1)(c) and 45.
 125. Section 11.
 126. *Narcotic Control Act*, s. 10(4).
 127. [1950] 2 D.L.R. 265 at 270 (Ont. C.A.).
 128. *R. v. Larlham*, [1971] 4 W.W.R. 304 (B.C.C.A.).
 129. For example: *R. v. Verge*, [1971] 4 W.W.R. 116 (B.C.C.A.); *R. v. Madigan* [1970] 1 C.C.C. 354 (Ont. C.A.); *R. v. Coughlin, ex parte Evans*, [1970] 3 C.C.C. 61 (Alta. S.C.); *R. v. Shipley* [1970] 3 C.C.C. 398 (Ont. Co. Ct.); *R. v. Omerod* (1969), 6 C.R.N.S. 37 (Ont. C.A.).
 130. See *R. v. Omerod*, (1969), 6 C.R.N.S. 37 (Ont. C.A.).
 131. In *R. v. Coughlin, ex parte Evans*, [1970] 3 C.C.C. 61 (Alta. S.C.) a person sought unsuccessfully to bring a prosecution against a police constable for aiding and abetting trafficking. He had been convicted of trafficking in marijuana on the evidence of the constable, who, acting as an undercover agent, had purchased the marijuana from him. The court held in effect that the constable was in no different position than any other purchaser, and that since purchase does not constitute trafficking it would defeat the purpose of the law to hold that it could amount to an aiding and abetting of trafficking. In effect, the court attached no importance to the particular purpose for which the purchase had been made.
 132. For a discussion, without expression of opinion: *R. v. Omerod*, 6 C.R.N.S. 37 at 44-66; for obiter dicta that the defence does not exist in Canadian law:

- Lemieux v. the Queen*, [1968] 1 C.C.C. 187 at 190; *R. v. Chernecki*, 4 C.C.C. (2d) 556 at 559–560.
133. In *R. v. Shipley*, [1970] 3 C.C.C. 398 (Ont. Co. Ct.), a case in which an undercover agent had persuaded a young person to obtain drugs for him, a judge of the County Court ordered a stay of prosecution on the ground that the court had an inherent power to prevent abuse of process. The court relied on the decision of the Ontario Court of Appeal in *R. v. Osborn* 5 C.R.N.S. 183. There the Court of Appeal had exercised an inherent jurisdiction to prevent a person from being prosecuted for an offence very similar to one of which he had been earlier acquitted. The decision of the Court of Appeal was unanimously reversed by the Supreme Court of Canada (12 C.R.N.S. 1), and the conviction restored. It is not clear from the opinions rendered in the Supreme Court whether the judges were of the opinion that there was no inherent jurisdiction to prevent abuse of criminal process or whether they simply felt that the facts did not show oppression in the particular case. At the very least, the judgement in *Osborn* leaves considerable doubt as to whether *Shipley* can stand as good law. But cf. *R. v. Kowerchuk*, 3 C.C.C. (2d) 291 (Prov. Ct.), which followed the view adopted by the Ontario Court of Appeal in *Osborn* as to an inherent jurisdiction to prevent abuse of process and ordered a stay of proceedings, although the case was not one of police instigation of an offence; also *R. v. MacDonald*, 15 C.R.N.S. 122 (B.C. Prov. Ct.) which dismissed a charge of trafficking on the ground of abuse of process because of instigation by an undercover agent.
 134. *R. v. Price*, 12 C.R.N.S. 131 (Ont. C.A.).
 135. *Sorrells v. United States*, 287 U.S. 435 (1932).
 136. These requirements are often applied, however, in cases in which there is an option to proceed by indictment or summary conviction, since the offence is in fact an indictable offence, but the practice varies.
 137. *R. v. Smythe*, 3 C.C.C. (2d) 366 (S.C.C.).
 138. These interviews were conducted by Professor John Hogarth, who directed the Commission's project of empirical research into various aspects of law enforcement. They were confined to judges outside Quebec. There was a separate study of judicial attitudes in Quebec which will be referred to in a subsequent report.
 139. For cases in which prison sentences have been imposed or increased on appeal: *R. v. McNicol*, 5 C.R.N.S. 242 (Man. C.A.); *R. v. Lehrmann*, [1968] 2 C.C.C. 198 (Alta. C.A.); *R. v. Adelman*, [1968] 3 C.C.C. 311 (B.C.C.A.); *R. v. Morrison*, [1970] 2 C.C.C. 190 (Ont. C.A.); *R. v. O'Connell*, [1970] 4 C.C.C. 162 (P.E.I.C.A.); *R. v. Cuzner*, [1970] 5 C.C.C. 187 (Ont. C.A.); *R. v. Dejong*, 1 C.C.C. (2d) 235 (Sask. C.A.); *R. v. Doyle and others*, 2 C.C.C. (2d) 82 (Alta. C.A.). For cases in which sentences have been reduced on appeal: *R. v. Vautour*, [1970] 1 C.C.C. 324 (N.B.C.A.); *R. v. Doxen*, [1970] 3 C.C.C. 431 (Ont. C.A.).
 140. *R. v. Hartley and McCallum* (No. 2), [1968] 2 C.C.C. 187 at 189 (B.C.C.A.).
 141. *R. v. Hudson*, [1967] 2 O.R. 501 (Ont. C.A.).
 142. *R. v. Simpson*, [1968] 2 O.R. 270 (Ont. C.A.).
 143. *R. v. Perrin*, [1971] 14 C.R.N.S. 24 (Que. C.A.).

Chapter 6

Conclusions and Recommendations

6. Conclusions and Recommendations

CONCLUSIONS AND RECOMMENDATIONS

of

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THE ISSUES

The general issue concerning cannabis is whether there is a well-founded social concern about its non-medical use, and if so, how that concern should express itself in social policy.

This general issue resolves itself into several specific questions. What consequences of behaviour are we to regard as legitimate grounds for social concern? What, in the light of these criteria, are the facts concerning cannabis? What should our objective of social policy be? What instruments of social policy are available to us? What criteria are to determine their appropriateness?

WHAT CONSTITUTES LEGITIMATE GROUNDS FOR SOCIAL CONCERN

In the *Interim Report* we adopted the following general position:

Our own view is that while we can not say that any and all non-medical use of psychotropic drugs is to be condemned in principle, the potential for harm of non-medical drug use as a whole is such that it must be regarded, on balance, as a phenomenon to be controlled. The extent to which any particular drug use is to be deemed to be undesirable will depend upon its relative potential for harm, both personal and social. [Paragraph 390]

We are still of the opinion that harm is the most useful criterion for social policy. We do not find the notion of drug "abuse" (or "misuse" for that matter) very helpful. In some cases it seems to be equated with the use of any drug which has a potential for producing dependence, physical or psychological. If it is equated with the drug use that actually produces dependence, then it is equated with only one potential aspect of harm. Certain kinds of drug use may produce harm quite apart from dependence, and in some cases, any use of a particular drug may involve the risk of harm.

What should be regarded as adverse psychological effect is subject to controversy. What should be the criteria of psychological harm? What should be the standard of psychological functioning by which psychological harm is to be measured? Presumably, an adverse psychological effect is any impairment of the normal psychological condition and functioning of the individual, but what is to be considered normal, and what a significant impairment? There is no difficulty with extreme psychological reactions such as the acute psychotic episode or 'freakout', but what about the more subtle effects, such as

the alleged lessening of interest or motivation that is referred to as the amotivational syndrome? The individual concerned may not consider it to be a particularly adverse effect. It will often tend to be regarded from the perspective of its social effects. Opinions will differ as to what should be regarded as abnormal psychological functioning.

We have found the concepts of personality and personality change elusive bases for the measurement and evaluation of drug effects. The concept of personality is imprecise. There is really no satisfactory definition of personality with which all people can agree. Moreover, there seems to be little known about how personality change is effected—at least insofar as those elements which may be affected by drug use are concerned. The concept of personality does not convey any criteria of value. By contrast, the concept of mental health presents an assembly of values which may serve as a more useful frame of reference for the evaluation of psychological harm. As with the definition of personality, the criteria of mental health are by no means free from difficulties of interpretation and application, but they do offer a clearer set of psychological values than the concept of personality by which to judge the harmful effects of non-medical drug use. The following psychological attributes or processes are currently serving as widely accepted criteria of mental health: perception of outer reality; perception of one's own identity; resistance to stress; autonomy (or the freedom to make decisions); potential for self-actualization; and mastery of one's environment.

The effects of certain kinds of non-medical drug use on society as a whole are also a ground for social concern. These effects include: the danger presented to others by drug-affected behaviour in some cases, such as violence or impaired functioning; the cost to society of treatment and other kinds of care and attention; the effects on the capacity to carry out vocational and family responsibilities; the effect which certain drug users may have, by contact, example, and persuasion, in inducing others to engage in harmful drug use. There is a concept of social harm, more difficult to define, which consists of the fear that certain non-medical drug use will have an adverse effect on the motivation, attitudes and capacity required to maintain our present institutions and our political, economic and social life. This involves, of course, the difficult area of value judgement, including conflicting cultural or ideological outlook. Whatever our respective views of the merits of this concern in particular cases, and how far the things feared can truly be characterized as matters of "harm", or more generally as questions of morality, we are convinced that the fear is very real and is a potent factor to be reckoned with in the development of social policy.

THE BASES FOR SOCIAL CONCERN ABOUT CANNABIS

General. The evidence of the potential for harm of cannabis is far from complete and far from conclusive. It is possible to find some fault with the methodology or the chain of reasoning in virtually all of the evidence. Explaining away the evidence on one side or the other has become a favourite pastime of participants in the cannabis controversy. What is significant is that there is a growing body of evidence to explain away. The literature on adverse psychological reactions, both here and abroad, is now quite extensive.

There are problems in proving causality, but the hypotheses are persistent. It is not difficult to point out why other factors may be the cause of these mental disorders, but we cannot afford to ignore the possibility that cannabis may be the cause of them.

The picture with respect to long-term effects is not really very much clearer than it was at the time of our *Interim Report*. As we suggested then, it may take as long as ten years or more to obtain the answers to important questions. It will take at least that long to determine the statistical significance of cannabis-related disorders now being reported by clinicians. What has come to our attention with respect to long-term effects since the *Interim Report* is matter for cautious concern rather than optimism. At this time, these observations by some clinicians who are in contact with chronic, heavy users of cannabis are nothing more than straws in the wind, but together they reinforce an uneasy impression that, in certain kinds of individuals and at certain levels of use, cannabis can cause serious mental problems. The questions are: in what kinds of individuals and at what levels of use? The answers to these questions are only likely to emerge with any kind of statistical validity after a significant number of years of experience with established patterns of use. It is simply too early in North American experience of the widespread social use of cannabis to hope to be able to obtain these answers. We should be selecting groups of cannabis users now, with matched control groups, for close follow-up study over a period of years.

On the whole, the physical and mental effects of cannabis, at the levels of use presently attained in North America, would appear to be much less serious than those which may result from excessive use of alcohol. However, there has not been sufficient experience with long-term, excessive use of cannabis under North American conditions to justify firm and final conclusions. There are many hypotheses arising from recent clinical reports which require further, careful investigation.

An important question is the frequency of use which regular users of cannabis are likely to attain under conditions of relatively easy availability. We think it is likely that under the stressful conditions of modern life an increasing number of people will take to smoking cannabis daily, and even several times a day. The patterns of use have not yet fully developed and become stabilized.

The short-term physical effects of cannabis (apart from those which affect psychomotor abilities) are relatively insignificant on normal persons, and there is as yet no evidence of serious long-term physical effects from use at current levels of consumption in North America. Because of the technique of long inhalation practised in smoking cannabis it does not seem unreasonable, however, to reckon on the possibility that excessive use of cannabis may cause or potentiate bronchial pulmonary disorders or aggravate the incidence of lung cancer and other diseases of the respiratory system resulting from the use of tobacco. There is a very close association between the smoking of cannabis and the smoking of tobacco. Most people who use cannabis also use tobacco. Another area of concern is possible effect on chromosomes and on the human foetus. There is as yet no clear evidence of adverse effect of this kind, although it is prudent for women not to use cannabis during pregnancy.

Recently, certain British doctors have speculated, on the basis of their clinical observations, that the chronic use of cannabis may result in cerebral atrophy, or irreversible shrinking of brain tissue. The subjects of this study also used amphetamines and LSD, and the doctors note that further study will be necessary to confirm a causal relationship between cerebral atrophy and cannabis. At the very least, however, the study indicates the possibility of an association between multi-drug use and permanent brain damage.

Four major areas of social concern are: the effect of cannabis on adolescent maturation; the implications of cannabis use for the safe operation of motor vehicles and other machinery; the possibility that the long-term heavy use of cannabis will result in a significant amount of mental deterioration and disorder; and the role played by cannabis in the development and spread of multi-drug use.

Effect on adolescent maturation. We are in general agreement that the regular use of cannabis by adolescents has, in all probability, a harmful effect on the maturing process, and that this should be the chief focus of our social concern. We do not have experimental evidence for this conclusion but we believe that it is a reasonable inference from what we know of the nature of cannabis and adolescent development.

The subjective experiences of cannabis intoxication—particularly intoxication with high doses possessing hallucinogenic properties—and alcohol intoxication are in our opinion essentially different. Alcohol may produce a blunting of perception and a gross disinhibition of behaviour, while an hallucinogenic experience may lead to an extreme intensification of the processes of perception as well as to qualitative distortion of space-time relationships. Such experiences are often also associated with striking changes in one's perception of his own body image and personal identity. This special nature of hallucinogenic experiences conceivably may have a lasting traumatic impact on the maturation of a 12 or 13-year old who is probably not yet capable of assimilating this kind of experience without suffering harm.

It seems completely unrealistic to assume that adolescents, beginning as early as the age of twelve, can persistently resort to cannabis intoxication with its hallucinogenic effects without seriously interfering with development of the capacity to cope with reality that is an essential part of the process of maturation. There is also the probability that the use of cannabis will have the effect of precipitating mental disorders in those who are particularly vulnerable to them. The evidence as to the effects of cannabis on the learning process and on academic performance is inconclusive, although there is a good deal to suggest that frequent use of cannabis may have adverse effects on these functions, mainly because of its effect on short-term memory and attention. It is a virtual certainty that heavy use of cannabis will have an adverse effect on these functions.

Probably the most serious thing about cannabis is that it is being used by adolescents. The most ardent proponents of legalization do not pretend that this is a matter of indifference. Virtually all proposals for legalization contemplate an age limit, usually 18, below which cannabis would not be available.

Effect on driving. The normal use of cannabis produces significant distortion of perception and impairment of cognitive functions and psychomotor ability. These effects tend to increase with the dose and the complexity of the task involved, but they are observable at moderate doses. Cannabis also has an adverse effect on short-term memory, sustained attention and vigilance, all of which can have an important bearing on complex tasks involving the handling of machinery.

There is reason to believe now that the short-term effects of cannabis increase the hazards of driving. There is no evidence that the use of cannabis has been a significant cause of automobile accidents, but at moderate doses it produces significant impairment of capacities required in driving. It is, therefore, a factor which is likely to increase the chances of accident. There is uncertainty as to the factors that are the principal causes of automobile accidents—attitudes may be as important as driving skills—but impairment of driving skills must obviously be a contributing factor. More investigation is required to show the effects of cannabis on driving skills at the various dose levels which could conceivably be attained under North American patterns of use, but on the basis of the evidence to date it must be said that the use of cannabis has a potential for causing injury through automobile accidents. In the light of our experience with alcohol there is no reason to assume that there will not be many people who will drive while under the influence of cannabis.

There is, moreover, no clear line of demarcation separating cannabis users from users of alcohol. The notion that cannabis users generally give up alcohol has been shown to be a myth. The vast majority of people who use cannabis also use alcohol, although their consumption of it may be reduced. The two are often used together on the same occasion, with additive effects. Thus cannabis may not only be a significant factor in relation to automobile accidents when used alone but even more so because of its effects when used with alcohol. An important distinction between cannabis and alcohol, insofar as the implications of the effects on psychomotor abilities are concerned, is that cannabis intoxication is still unrecognizable and undetectable. It is virtually impossible to tell whether a person is 'high' on cannabis unless he tells you, and as yet it has not been possible to devise a practical method for detecting the presence and concentration of THC or other active cannabinoids in the body. Nor is the outlook very promising for the development of a simple and convenient method of detection that would serve a function similar to that of the Breathalyzer in the detection and measurement of alcohol in the human body. It is a reasonable operating assumption that there will continue to be great practical difficulty in detecting and proving that a person is driving while the ability to drive is impaired by the use of cannabis.

A matter of some concern with respect to the effect of cannabis on driving is the possibility of an echo effect, or 'flashback', in which the effects of cannabis or some other hallucinogen, such as LSD, are unexpectedly experienced some time after the last occasion of use. There is evidence that such a phenomenon has occurred in some cases, but it would appear to be rare. Like other effects of cannabis, however, it might well increase with increase in the levels of use.

There has been some experimental investigation of possible effect on other

functions of particular relevance to driving—recovery from bright-light glare, dark-adaptation time, and dim-light acuity. There is as yet no clear indication of cannabis-related impairment of these functions, but the possibility of such an effect requires further study.

Effect on mental health. The acute panic reactions or “psychotic episodes” which cannabis can produce at certain dose levels and under certain circumstances can be extremely unpleasant, but they would appear to be relatively infrequent and generally of short duration. They indicate, however, that the effect of cannabis upon the mind is a potent one.

There is much concern that the chronic use of cannabis may precipitate mental disorders in persons who are vulnerable to them but who might otherwise avoid them except for the action of cannabis. It is not clear from recent clinical reports of cannabis-related disorders how far these are peculiar to cannabis, how far they are precipitated or aggravated by cannabis, and how far they merely happen to coincide with cannabis use. The fact that there has been no prior evidence of psychopathology is not conclusive, since the mental disorder may have been lying dormant.

A number of reports from clinicians in North America in recent years have suggested that the long-term use of cannabis may cause serious mental disorders. Although these observations may be valid in themselves they do not give us any basis for estimating the frequency with which such conditions might be expected to occur in the cannabis-using population. Surveys of hospitals and university health services have uncovered a very small number of such cases. As yet, North American conditions have not revealed a clearly identifiable “cannabis psychosis” which may be attributed to chronic use. It is too early, however, to assume that such a condition cannot occur since there is not yet a firmly established pattern of long-term use at high dose levels.

The evidence of “personality change” of the kind referred to as the “amotivational syndrome” resulting from the chronic, heavy use of cannabis is inconclusive. There is also a great difference of opinion as to whether certain changes of attitude or outlook which have been associated with the use of cannabis are to be considered a good or a bad thing. It is difficult to distinguish between adverse effect on capacity and mere change in attitude. At the same time certain changes in attitude can reduce effective capacity, for effective capacity depends upon will. Some observers have spoken of apathy and a loss of goals, an absorption in the present with little or no thought for the future. All of these symptoms might be equally associated with a profound change of values and outlook which many might regard as salutary. Obviously, this is very controversial ground, but it is not unreasonable to assume that persistent resort to cannabis intoxication may produce mood changes and impairment of will and mental capacity that have nothing to do with freely chosen attitudes and life style, but may, for example, be the result of some biochemical effect on the balance of mood-regulating neurotransmitters in the brain.

Effect on multiple-drug use. One of the society’s chief concerns about cannabis is that it may lead individuals into a pattern of multiple-drug use, including the use of much more dangerous drugs, such as the stronger

hallucinogens, the amphetamines and the opiate narcotics. This alleged relationship between the drugs is sometimes referred to as the "progression" or "stepping-stone" theory. In its most simplified form it contends that the use of cannabis leads to the use of heroin.

There is unquestionably a great deal of multiple-drug use in which cannabis plays a part. The question is whether people would have used the other drugs had they not used cannabis. Unfortunately, there is no way of obtaining an answer to this question. The reasons people take up the use of various drugs are too complex to be able to assign causal significance to one factor or another. Certain kinds of individuals would likely engage in multiple-drug use whether cannabis existed or not; they would start with other drugs. We must not forget that alcohol is still the most widely used drug of all and figures in the background of most multi-drug users. Nevertheless, we believe that by stimulating a taste for drug experiences, lowering inhibitions about experimenting with more dangerous drugs, and leading to personal associations and involvement in a pattern of life which emphasizes an interest in drugs, cannabis must be reckoned as a potent factor contributing to the growth of multi-drug use. It is not necessary to make a clear case of causation in order to place the role of cannabis in multiple-drug use in some plausible general perspective. The attacks on a hypothesis of causation to some extent set up a "straw man". Obviously, there are many factors leading a person to use a variety of drugs. The point is whether cannabis is one of the factors which helps to increase the likelihood that a significant number of people will engage in multi-drug use. We believe that it is, and that it is reasonable to assume that many would not engage in certain kinds of drug use if they did not use cannabis.

These predisposing relationships are not established by statistics. They are, rather, inferences from the nature of the drugs and the patterns of drug use. The fact that a very high proportion of the users of a certain drug have also been users of cannabis does not establish a causal relationship between the two kinds of drug use. On the other hand, there are affinities between certain kinds of drug use which are strongly suggestive of a predisposing relationship. We believe, for example, that there is probably such a relationship between the use of cannabis and the use of LSD. This cannot be established statistically^[a] but it is an inference from the nature of the two drugs and their close association in the drug culture. We believe that the use of cannabis probably reduces inhibitions about the use of LSD, and that it is unlikely that many individuals would experiment with LSD before having used cannabis. The general conclusion that we draw is that while only a proportion of users of cannabis will also use LSD, the use of cannabis definitely facilitates the use of LSD or predisposes a certain number of individuals to experiment with it.

The relationship between the stronger hallucinogens, the amphetamines and the opiate narcotics is not as clear. There is obviously a close relationship between the intravenous use of amphetamines and the use of heroin. The relationship between the hallucinogens and the amphetamines is less obvious. It has often been assumed that the users of hallucinogens and the users of amphetamines are quite different populations who live in two separate worlds. This assumption has been based on the difference in the effects of the

two classes of drugs and in the cultural associations surrounding their use, as well as the difficulty of overcoming the "needle barrier" for the intravenous use of amphetamines. These factors may still operate to inhibit movement between these two kinds of drug use, but there is evidence that a significant number of people use both. Our surveys indicated that in 1970, in Canada as a whole, over 50 per cent of the persons who had used amphetamines at one time or another had also used cannabis and LSD. Amphetamines are often used to overcome a depression produced by excessive use of hallucinogens. Moreover, amphetamines are sometimes mixed with 'street' LSD, and some drugs which are generally classed among the strong hallucinogens, such as MDA, combine the properties of amphetamines and hallucinogens.

Thus there is a marked relationship between cannabis and LSD, a less obvious one between LSD and the amphetamines, and a marked relationship between speed and heroin. Because of this succession of relationships, which can be linked up, it is possible for people to progress from cannabis through LSD and 'speed' to heroin, but the number of cannabis users of whom this might possibly be true would be a very small proportion of the total number of cannabis users—less than one per cent.

The theory that cannabis leads to heroin because the vast majority of heroin users are found to have used cannabis has to be dismissed on the ground of faulty logic: the vast majority of heroin users may have used cannabis, but the vast majority of cannabis users do not use heroin. The real question is whether a significant number of heroin users would not have used heroin had they not used cannabis. Unfortunately, it is impossible to answer such a question.

It is sometimes argued that if cannabis were not readily available more people would use more dangerous drugs such as the stronger hallucinogens and the amphetamines, and that any policy which restricts the availability of cannabis encourages the use of more dangerous drugs. The argument that cannabis users will turn to other, stronger drugs, if they cannot have cannabis, is an argument which, if anything, reinforces the view that cannabis facilitates resort to stronger drugs. It is at least not inconsistent with such an hypothesis. It is also based on the assumption that those who would resort to stronger drugs in times of cannabis shortage would not do so when it is available. This seems to suggest—contrary to other arguments which the same people generally make concerning cannabis—that cannabis creates such a desire for drug experiences that people will run the risk of using stronger, more dangerous drugs rather than go without.

Cannabis and other crime. One of the contentions used to support the current legislative policy on cannabis is that cannabis is a significant factor in the cause of other crimes. There is a discussion of this issue in Chapter 2, including evidence presented to us by the R.C.M. Police.

The suggestion that cannabis can be a cause of serious crime has come mainly from other countries. It is impossible to verify the evidence. It may well be that in certain cases cannabis has been used, just as alcohol apparently sometimes has, to lower inhibitions and to make it easier to commit a crime

of violence which the criminal has already formed an intention of committing. There has been little evidence in Canada to support an association of cannabis with crimes of violence. Nor is there any suggestion that cannabis users are obliged to engage to any significant extent in a career of petty crime to support their habit in a manner similar to that of heroin addicts or even 'speed freaks'. The use of cannabis, under present conditions, does involve exposure to contact with criminal elements and may encourage a certain amount of delinquency or anti-social behaviour in some users. But we do not believe there is evidence to support a generalization in this regard. Many users of cannabis exhibit high ethical standards, apart from their wilful violation of the drug laws. This aspect of the case against cannabis appears to reduce itself upon closer examination to a disapproval of the attitudes and values of cannabis users, and particularly their attitude towards conventional standards of behaviour and morality.

We have referred to the physical and mental effects of cannabis, its role in the development and spread of multi-drug use, and its relation to other crime. It is also necessary to consider the perspective in which it is viewed by the majority of people in its relation to the social harm which they consider is caused by non-medical drug use in general. The drug use with which the majority is chiefly concerned is that which has not yet become a socially accepted part of the culture. It is the drug use which is considered to be outside the pale: the use of hallucinogens, the intravenous use of amphetamines and the use of opiate narcotics. There are varying degrees of concern about the heavy use of alcohol, tobacco, tranquilizers, barbiturates, and oral amphetamines, but these are not the focus of the great concern with drug use in recent years. When they think of the social harm caused by drug use the majority of the people seem to be chiefly concerned with its effect on the leading of reasonably normal and productive lives. They more or less accept the drug use in which people engage in order to help them to function effectively in conventional lines of endeavour. But it is the presumed effect of certain kinds of drug use on the motivation and attitudes required for conventional patterns of living which is the chief concern of the majority of people. They fear that certain kinds of drug use will sap the will and capacity for functioning in a socially acceptable manner. They very much fear the development of a widespread passivity and withdrawal from responsibility for the everyday work required to make the society function effectively. We have to face this attitude squarely. Whatever our personal views may be of the cultural conflict which underlies it, it cannot be brushed aside in a spirit of lofty detachment. It is a very real fear. It is this fear which is reflected in the concern with the "amotivational syndrome."

There is a widespread feeling that certain kinds of drug use adversely affect certain qualities which have played an important part in the development and functioning of our present society: aggressivity, competitiveness, acquisitiveness, goal-orientation, the willingness to defer present pleasure for future rewards, and the capacity to tolerate the tedium of routine tasks, particularly those requiring painstaking attention to detail. Those who are critical of modern industrial society, particularly of the western variety, and of the values and attitudes that make up its dynamic, reply that it will be a good thing in the end if the old values and attitudes are undermined and replaced

by new ones, less aggressive, less competitive, more co-operative, less activist, more contemplative, less materialistic and acquisitive, more oriented toward simplicity in demand and pleasure, less dependent on things, and more able to enjoy the simple pleasures of being human in the natural environment.

This is not an issue that can be resolved by polemic. It is far better frankly to face the fact that there are definitely two points of view that are not likely to be reconciled, at least not without a great deal more empirical evidence in the form of human experience. Drug use is not the cause of the cultural conflict. It is merely an aspect of it. But it may be to some extent a catalysing and reinforcing aspect. The close association of certain kinds of drug use with the cultural conflict which is shaking modern society is part of the essential perspective in which the debate about legislative policy must be conducted. Failure to recognize these factors makes reasonable accommodation very difficult.

To sum up, then, it seems to us that there are at least four major grounds for social concern: the probably harmful effect of cannabis on the maturing process in adolescents; the implications for safe driving arising from impairment of cognitive functions and psychomotor abilities, from the additive interaction of cannabis and alcohol, and from the difficulties of recognizing or detecting cannabis intoxication; the possibility, suggested by reports in other countries and clinical observations on this continent, that the long-term, heavy use of cannabis may result in a significant amount of mental deterioration and disorder; and the role played by cannabis in the development and spread of multi-drug use by stimulating a desire for drug experiences and lowering inhibitions about drug experimentation.

To these grounds of concern must be added the extent of its use, particularly among persons of high school age, as indicated in Chapter 4.

THE OBJECTIVE OF SOCIAL POLICY

In our opinion, these concerns justify a social policy designed to discourage the use of cannabis as much as possible, particularly among adolescents. We do not yet know enough about cannabis to speak with assurance as to what constitutes moderate as opposed to excessive use. In these circumstances, it is prudent to discourage its use generally.

THE AVAILABLE INSTRUMENTS OF SOCIAL POLICY

To control the use of a drug we must control availability and demand.

There are basically only two ways of controlling availability: criminal law prohibition and administrative regulation. Because of the profits to be made in trafficking there is no point in attempting to control availability by education, propaganda or moral suasion. The law must be used in a coercive or regulatory manner.

Prohibition is resorted to where the object is to eliminate the drug as far as possible; administrative regulation, where it is necessary to make it legally available to some extent. The issue with respect to cannabis is whether it is still desirable and feasible to attempt to pursue a policy of prohibition or whether conditions are such that we are obliged to resort to administrative regulation.

Administrative regulation may have objects other than the regulation of availability; it may seek to control quality and price. Prohibition is not directed to these matters although it may indirectly have an effect on them. Prohibition and administrative regulation may be compared in terms of their impact on availability, quality and price. These are not, however, the only important matters affected by these two legal approaches. Other matters are the effect on individuals of having to deal with an illicit rather than a licit market, and of having their conduct defined as criminal.

Demand may be controlled by the deterrence of criminal law prohibition, by information or education designed to dissuade people from using a drug by indicating its dangers, and by other influences and substituted activities in the home and elsewhere designed to remove the desire for drug use. Unlike the distribution of drugs, demand is more amenable to influences of a non-coercive or non-regulatory nature.

The object of our social policy must be to reduce the availability and demand of cannabis as much as possible, if that can be done at an acceptable cost. The question is whether, and to what extent, the criminal law is a proper instrument for such a policy. The answer to this depends on how effective the criminal law is in achieving its purpose, what the costs are of using it, and whether there are alternative methods of control that would achieve the purpose as effectively at less cost. An initial question is whether there is any reason in principle, apart from cost-benefit, why the criminal law should not be applied against this kind of behaviour.

WHETHER, IN PRINCIPLE, THE CRIMINAL LAW SHOULD BE USED IN THE FIELD OF NON-MEDICAL DRUG USE

Some people take the position that non-medical drug use is an entirely personal and private matter, not unlike many other things that one does with one's body in the satisfaction of various appetites and the pursuit of various pleasures, and if any harm is being done it is harm which one is doing to oneself alone. They argue that the law should be concerned only with the damage or injury which an individual directly causes to another as a result of drug use. The classic exposition of this point of view is to be found in John Stuart Mill's celebrated *Essay on Liberty*, in which he states his central proposition as follows:

The object of this Essay is to assert one very simple principle, as entitled to govern absolutely the dealings of society with the individual in the way of compulsion and control, whether the means used be physical force in the form of legal penalties, or the moral coercion of public opinion. That principle is, that the sole end for which mankind are warranted, individually or collectively, in interfering with the liberty of action of any of their number, is self-protection. That the only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others. His own good, either physical or moral, is not a sufficient warrant. He cannot rightfully be compelled to do or forbear because it will be better for him to do so, because it will make him happier, because, in the opinions of others, to do so would be wise, or even right. These are good reasons for remonstrating with him, or reasoning with him, or persuading him, or entreating him, but not for

compelling him, or visiting him with any evil, in case he do otherwise. To justify that, the conduct from which it is desired to deter him must be calculated to produce evil to someone else. The only part of the conduct of any one, for which he is amenable to society, is that which concerns others. In the part which merely concerns himself, his independence is, of right, absolute. Over himself, over his body and mind, the individual is sovereign.

The fundamental value which Mill emphasizes is freedom, and it is not freedom as an abstract principle or independent good, but as a utilitarian value with which he is concerned: the necessity of freedom to the development and well-being of the individual and society. There is no question that we, as a democratic society, regardless of our particular or individual political persuasion, are profoundly committed to the supreme importance of freedom. But opinions differ as to its proper or necessary limits, and the issue as to what should be the legislative policy towards non-medical drug use reflects the debate as sharply as any.

Before considering the response which has been made to Mill's thesis by philosophers and laymen, it should be observed that Mill himself admitted one very important qualification to his general principle that is of particular relevance for the subject of non-medical drug use. He took it to be obvious that the principle, that the state does not have the right to interfere with an individual in order to prevent him from causing harm to himself, does not apply to persons who do not have the requisite maturity for the exercise of truly free choice. As Mill put it:

It is, perhaps, hardly necessary to say that this doctrine is meant to apply only to human beings in the maturity of their faculties. We are not speaking of children, or of young persons below the age which the law may fix as that of manhood or womanhood. Those who are still in a state to require being taken care of by others, must be protected against their own actions as well as against external injury.

This is, of course, a qualification of major significance insofar as non-medical drug use is concerned because young people are so heavily involved in it. Unfortunately, Mill does not indicate the kind of intervention which he would consider appropriate to protect the young from causing harm to themselves. We do not know what intervention he would consider possible and compatible, as a practical matter, with the freedom on which he would insist for adults. As to the limits of state intervention which he would regard as permissible, insofar as adults are concerned, Mill indicates the general tenor of his thinking in certain observations concerning government policy with respect to poisons and the consumption of alcoholic beverages. Always making exception for the protection of the young, his policy with respect to poisons is that where they have legitimate uses the government must limit its intervention, despite the risks of harm, to assuring that people are suitably warned of the dangers by proper labelling. His reasoning is that, assuming such poisons have useful purposes, people should not be deprived completely of access to them merely because they present serious dangers. He goes further and says that people should not be put to the inconvenience and expense of having to obtain a special permission, such as a doctor's prescription, to obtain them. This is, in fact, the general approach which is adopted

by present legislative policy to a wide variety of substances with a potential for harm, at least in certain applications. It is felt that they cannot be removed entirely from the market because of their necessity or usefulness. Such is the case with drugs having a medical value, despite the dangers which they may present in certain applications, and such is the case with the wide variety of industrial and household products containing volatile substances, gases and solvents. Despite their potential for harm, especially to young people, as a result of their chemical properties, it is not practicable to consider their removal from the market because of their utility, and in many cases necessity, in legitimate uses. Occasionally, it may be necessary to remove a substance entirely from the market because of its general hazard to health even in its principal application. Such was the case with the cyclamates. With drugs having therapeutic value, the requirement of a prescription must for the reasons indicated by Mill—inconvenience and cost—be applied very judiciously.

With respect to the consumption of alcoholic beverages, Mill is of course against prohibition, and he sees the prohibition of sale as an attempt to prohibit use, as an infringement not only of the liberty of the seller but of the liberty of the user as well. Thus Mill would appear to be opposed to the “vice model” (which obtains in such matters as pornography and prostitution) whereby the law punishes the seller but not the user. At the same time Mill acknowledges that trade is a “social act” with which government has a right to concern itself. In other words, it affects others besides the trader. But on closer examination of what he has to say, it would appear that Mill is somewhat ambivalent or uncertain as to how far and upon what principles society is justified in interfering with the operations of the seller or purveyor of goods or services of which it disapproves. He concedes some force in the argument that access to the means of indulging in certain vices such as gambling and prostitution should be rendered as difficult as possible so as to reduce the opportunities for contact with them, but he does not feel that the same considerations apply to the sale of alcoholic beverages. The following passage reflects the general direction of his thinking, if not the whole of his analysis on this point:

There is considerable force in these arguments. I will not venture to decide whether they are sufficient to justify the moral anomaly of punishing the accessory, when the principal is (and must be) allowed to go free; of fining or imprisoning the procurer, but not the fornicator, the gambling-house keeper, but not the gambler. Still less ought the common operations of buying and selling to be interfered with on analogous grounds. Almost every article which is bought and sold may be used in excess, and the sellers have a pecuniary interest in encouraging that excess; but no argument can be founded on this, in favour, for instance, of the Maine Law; because the class of dealers in strong drinks, though interested in their abuse, are indispensably required for the sake of their legitimate use. The interest, however, of these dealers in promoting intemperance is a real evil, and justifies the State in imposing restrictions and requiring guarantees which, but for that justification would be infringements of legitimate liberty.

Mill recognized that such enterprises may be properly subjected to a variety of regulations and safeguards touching such matters as the reliability of the

proprietors, hours of opening and closing, and the like, but he did not think that the regulations should have as their object, the attempt, by restricting the number of outlets, to render access to alcoholic beverages more difficult. Hence the reasoning seems to be that alcoholic beverages can be resorted to without abuse, and that it is not right to subject the majority who do not abuse them to inconvenience simply because of those who are liable to do so. Finally, Mill conceded that it was legitimate to allow a relatively heavy burden of taxes to fall upon alcoholic beverages since such taxes, which must be imposed by the state for revenue purposes, are bound to inhibit some forms of consumption. "It is hence the duty of the State," said Mill, "to consider, in the imposition of taxes, what commodities the consumers can best spare; and *a fortiori*, to select in preference those of which it deems the use, beyond a very moderate quantity, to be positively injurious. Taxation, therefore, of stimulants, up to the point which produces the largest amount of revenue (supposing that the State needs all the revenue which it yields) is not only admissible, but to be approved of."

It is not clear from all this how Mill would approach the modern phenomenon of non-medical drug use, and more particularly how he would propose to allow adults freedom while providing adequate protection for the young. It is a reasonable assumption that he would have assimilated all non-medical use to that of alcohol and would have favoured a system of legal availability with regulations designed to minimize the opportunities for exposure of the young to it. It is also probable, however, that Mill would have found the problem particularly perplexing because of the extent to which modern youth is actively engaged in non-medical drug use. He might also have found considerable difficulty in determining that degree of maturity or discernment which should distinguish those who require protection from those who do not. The point is that Mill's general principle of non-interference with conduct that does not cause harm to third persons or to society generally is clear enough as an abstract proposition; it is its application, with its important qualification that the state has the right to intervene to protect persons under the age of maturity from causing harm to themselves, that presents difficulty, particularly in the context of contemporary drug use. With certain drug use the issues, if Mill's principles were to be followed, would be not merely how to protect the young while allowing freedom for the mature, but how to ameliorate the present problem, by a system which continued to attempt to deprive the young of access to the drug.

Mill's thesis has been challenged by other philosophers and laymen on several grounds. First, there is challenge of the assumption that might seem to be implicit in Mill's general position, that harm which one causes to oneself can never be a cause of harm to others or to society generally. Many—indeed, we would think the vast majority—would strongly dispute this suggestion, particularly with respect to non-medical drug use. They would stress the effect which harmful drug use frequently has on the members of the user's family in emotional disturbance, family relations and discharge of one's family responsibilities, as well as the effect which it has on others in the community who must assume some responsibility for dealing with the consequences to the user and the members of his family—the demands upon the over-taxed resources of medical and social service facilities, sometimes causing neglect of

other priorities, as well as the expense of establishing and maintaining necessary additional facilities. They would also stress the general effect of harmful drug use on the motivation and productive capacity required to maintain the institutions and life of the society. They would be concerned with the possible effects of widely diffused drug use on the present way of life.

Actually, Mill concedes that the harm which one causes to oneself by a certain kind of behaviour may in many cases cause inconvenience, special burdens, and even injury to other individuals and to society generally, but he contends that this is not a reason for prohibiting the conduct altogether. It is his contention that we should deal with these secondary effects, as they arise, on their own merit as being attributable not to the general kind of conduct (for example, non-medical drug use) as such, but to certain factors in the individual, such as excessive use, lack of responsibility, and the like. Thus, in Mill's view, the fact that driving while under the influence of a drug may result in injury to others would not be a reason for prohibiting the use of the drug altogether. The injury to others is not the direct result of drug use as such but of driving while under the influence of the drug, and the law should direct itself to prohibiting and punishing this particular conduct rather than drug use as a whole.

While Mill in the enunciation of his central principle recognizes the right of society to use the criminal law or moral coercion for its legitimate self-protection, there is an implication that even if it could be demonstrated that non-medical drug use will frequently result in impairment of a person's general potential for usefulness to society, he would not consider this a sufficient ground for the exercise of such self-protection. This is where the issue is joined today. A majority of those who support the existing law do so not merely because of the effect of drug use on the welfare of the individual but chiefly because of what they feel to be its effect on the welfare of society as a whole. Mill would appear to exclude this, as a matter of principle, as a valid consideration for application of the criminal law, although the difference may be essentially a matter of appreciation of what constitutes a sufficient injury or harm to society to warrant intervention. What is really involved is a weighing of values: as Mill puts it, "the inconvenience is one which society can afford to bear, for the sake of the greater good of human freedom." Others take the view, in the case of non-medical drug use, that what is involved is more than a matter of "inconvenience" but rather a threat to other values on which the present society depends, such as the capacity and willingness to discharge personal responsibilities in work and personal relations, and that such value as there may be in the personal freedom to pursue non-medical drug use must cede to these other values which are held to be essential to the society's survival.

The philosophic debate concerning the appropriateness of the criminal law in the field of non-medical drug use is associated with expressions such as "crime without victim" and "law and morals" which obscure the essential issue: how different people characterize the personal and social effects of non-medical drug use in the light of their respective systems of value. This, rather than an abstract debate as to the appropriate limits of the criminal sanction, is what is really at stake. The quarrel is not so much with Mill's premises as

with the practical conclusions which he drew from them in the light of a nineteenth century liberalism. Once he concedes, as he does, that society has a right to use the criminal law to protect itself, that a special protection is owing to those under the age of majority, and that people may be restrained from giving public offence to the sense of decency of others, then it seems that what essentially separates him from his critics are questions of application—the weighing of the competing values in the light of the particular facts, and consideration of the ways and means best calculated to promote the ends.

For example, the English judge, Lord Devlin, who is generally regarded as the exponent of a legal philosophy that is at extreme variance with that of Mill, because of his insistence on the right, and indeed the duty, of the state to enforce morality, is seen on closer examination simply to take a different view of what the self-protection of the state requires. Although he speaks in a general way about the moral values of the majority as being essential to the preservation of the society, where the criminal law is concerned, his notion of morality is not divorced from consideration of the actual harm caused by particular conduct. It would not appear that in his view any departure from the prevailing moral code is to be considered a social harm warranting the application of the criminal law. Once again, it is a question of the subjective evaluation of the effects of certain conduct from the social point of view. His general approach is set out in the following passage from *The Enforcement of Morals*:

I think, therefore, that it is not possible to set theoretical limits to the power of the State to legislate against immorality. It is not possible to settle in advance exceptions to the general rule or to define inflexibly areas of morality into which the law is in no circumstances to be allowed to enter. Society is entitled by means of its laws to protect itself from dangers, whether from within or without. Here again I think that the political parallel is legitimate. The law of treason is directed against aiding the king's enemies and against sedition from within. The justification for this is that established government is necessary for the existence of society and therefore its safety against violent overthrow must be secured. But an established morality is as necessary as good government to the welfare of society. Societies disintegrate from within more frequently than they are broken up by external pressures. There is disintegration when no common morality is observed and history shows that loosening of moral bonds is often the first stage of disintegration, so that society is justified in taking the same steps to preserve its moral code as it does to preserve its government and other essential institutions. The suppression of vice is as much the law's business as the suppression of subversive activities; it is no more possible to define a sphere of private morality than it is to define one of private subversive activity. It is wrong to talk of private morality or of the law not being concerned with immorality as such or to try to set rigid bounds to the part which the law may play in the suppression of vice. There are no theoretical limits to the power of the State to legislate against treason and sedition, and likewise I think there can be no theoretical limits to legislation against immorality. You may argue that if a man's sins affect only himself it cannot be the concern of society. If he chooses to get drunk every night in the privacy of his own home, is any one except himself the worse for it? But suppose a quarter or a half of the population got drunk every night, what sort of

society would it be? You cannot set a theoretical limit to the number of people who can get drunk before society is entitled to legislate against drunkenness.

Despite the general sweep of his statements in favour of the enforcement of morality, it seems clear that Lord Devlin is involved in the same process as Mill of weighing the values of personal freedom and privacy against other values which he deems to be essential to the preservation of a certain kind of society. If anything, what possibly distinguishes them is the relative importance or primacy which Mill, in the particular political context of his time, assigned to freedom as a social as well as individual value. But the essential perspective of Lord Devlin is not at such variance with that of Mill as some of his language suggests. For at one place, he says: "There must be toleration of the maximum individual freedom that is consistent with the integrity of society." And at another place he says, "But before a society can put a practice beyond the limits of tolerance there must be a deliberate judgment that the practice is injurious to society." Thus, whether one agrees or not with Lord Devlin's assumption that morality is essential to the preservation of society, it would not appear to be his thesis that, irrespective of the harm which appears to be caused by the conduct in question, it is proper to use the criminal law to enforce morality.

Nevertheless Lord Devlin's general position on law and morality was attacked by the English philosopher, H.L.A. Hart, on the ground that since his belief in the importance of morality to the preservation of society appeared to be an *a priori* rather than an empirical conclusion, and he seemed to equate society with its morality, the natural and inevitable tendency of his position would be to regard *any* departure from the prevailing morality as a threat to the preservation of the society. Hart himself is in essential agreement with Mill that the criminal law should not be used to enforce morality, but he differs from Mill in regarding it as a legitimate object of the law to attempt to prevent individuals (including those of the age of maturity) from doing harm to themselves. This he justifies as "paternalism" (as distinct from "legal moralism", which he ascribes to Lord Devlin) on the ground that Mill exaggerated the capacity of adults to make wise use of their freedom. Hart's notion of paternalism may also impliedly challenge another assumption of Mill—that somehow the young can be protected while conceding freedom to adults. If an attempt is to be made to deny access to certain drugs to the young, either on the paternalistic basis of protecting them from causing harm to themselves or on the basis that their use of drugs will have an adverse effect on society as a whole, then it must be asked whether the achievement of this purpose is rendered more or less difficult by permitting adults to have access to such drugs.

On this whole philosophic issue as to whether, in principle, the criminal law should be used in the field of non-medical drug use, we adhere to the general position which we expressed in the *Interim Report* as follows:

...In our opinion, the state has a responsibility to restrict the *availability* of harmful substances—and in particular to prevent the exposure of the young to them—and that such restriction is a proper object of the criminal law. We can not

agree with Mill's thesis that the extent of the state's responsibility and permissible interference is to attempt to assure that people are warned of the dangers Obviously the state must be selective. It can not attempt to restrict the availability of any and all substances which may have a potential for harm. In many cases it must be satisfied with assuring adequate information. We simply say that, in principle, the state can not be denied the right to use the criminal law to restrict availability where, in its opinion, the potential for harm appears to call for such a policy. [Paragraph 442]

...Without entering into the distinction between law and morality, we also subscribe to the general proposition that society has a right to use the criminal law to protect itself from harm which truly threatens its existence as a politically, socially and economically viable order for sustaining a creative and democratic process of human development and self-realization. [Paragraph 443]

...The criminal law should not be used for the enforcement of morality without regard to potential for harm. In this sense we subscribe to what Hart refers to as the "moderate thesis" of Lord Devlin. We do not subscribe to the "extreme thesis" that it is appropriate to use the criminal law to enforce morality, regardless of the potential for harm to the individual or society.

If we admit the right of society to use the criminal law to restrict the availability of harmful substances in order to protect individuals (particularly young people) and society from resultant harm, it does not necessarily follow that the criminal law should be applied against the user as well as the distributor of such substances. There is no principle of consistency that requires the criminal law to be used as fully as possible, or not at all, in a field in which it may have some degree of appropriateness. We do not exclude in principle the application of the criminal law against the user since it is a measure which can have an effect upon the availability and the exposure of others to the opportunity for use, but the appropriateness or utility of such an application must be evaluated in the light of the relative costs and benefits. [Paragraph 444]

We did express a general reservation concerning the offence of simple possession as follows:

Our basic reservation at this time concerning the prohibition against simple possession for use is that its enforcement would appear to cost far too much, in individual and social terms, for any utility which it may be shown to have. We feel that the probability of this is such that there is justification at this time to reduce the impact of the offence of simple possession as much as possible, pending further study and consideration as to whether it should be retained at all. The present cost of its enforcement, and the individual and social harm caused by it, are in our opinion, one of the major problems involved in the non-medical use of drugs. [Paragraph 449]

In effect, it is not particularly helpful in this case to attempt to set theoretical limits to the application of the criminal law. The criminal law may properly be applied, as a matter of principle, to restrict the availability of harmful substances, to prevent a person from causing harm to himself or to others by the use of such substances, and to prevent the harm caused to society by such use. In every case the test must be a practical one: we must weigh the potential for harm, individual and social, of the conduct in question against the harm, individual and social, which is caused by the

application of the criminal law, and ask ourselves whether, on balance, the intervention is justified. Put another way, the use of the criminal law in any particular case should be justified on an evaluation and weighing of its benefits and costs. Generally speaking, the adverse effects for the individual of the criminal law process are such that it must be justified in each case by rational and convincing reasons of necessity, in relation to other available means of achieving the desired purpose.

We propose to address ourselves to the following questions: To what extent can we hope to achieve our objectives through use of the criminal law? Does the benefit which we think we obtain by the use of the criminal law outweigh the costs of using the criminal law in this particular case? What would be the effect of using the criminal law in some reduced measure? What would be the effect of replacing it by some other form of regulation? It is convenient to proceed with this analysis in terms of a comparison of criminal law prohibition and administrative regulation. The major issues in the choice between criminal law prohibition and administrative regulation of cannabis are whether criminal law prohibition exercises a more effective control upon availability and demand, and if so, whether this margin of control justifies the costs of criminal law prohibition in the form of the various adverse effects upon individuals, the law enforcement processes and the society generally.

CONTROL OF AVAILABILITY

A policy of administrative regulation—that is, making cannabis legally available under government controls—would increase rather than reduce availability. The government control of the distribution of alcohol is not really an effective limitation upon availability. Some attempt is made to limit the number of distribution outlets, and while this may cause some personal inconvenience in obtaining supplies, people are not effectively prevented from obtaining as much as they want. Unless one is prepared to introduce a quota or rationing system, administrative regulation is not a means of limiting or reducing availability, and even then there are ways of circumventing the system. The chief means by which a system of administrative regulation seeks to control use is through the effect of price or taxation on demand. It may set a price for a product, or impose such taxes upon it, as will discourage demand without encouraging the development of an illicit market. If we are to judge by the experience with alcohol and tobacco, this practice assures the state of an ample revenue but makes little effective impact upon the demand for a product which people greatly desire. They will continue to find the money for it even at the price of other things.

The probable effect of administrative regulation on availability to minors requires special consideration. Our experience with alcohol is that while sale to minors has been prohibited, young persons have not had difficulty in obtaining access to liquor. The extent of alcohol consumption by persons of high school age is proof of that. All the surveys show that there is a higher consumption of alcohol among high school students than any other drug, except tobacco. How they obtain it is not so clear: either the rule against sale to minors is not sufficiently enforced, or they arrange to have persons of age obtain it for them, or they have easy access to the supplies kept by parents and

others in their households. Probably it is a combination of all these factors. Although we do not have a basis for comparing the availability of liquor to minors under the present licensing system with that which would obtain under prohibition, there is certainly no reason to conclude that it is significantly restricted under the licensing system. The example of unrestricted adult use and the constant availability of supplies obtained by adults are bound to encourage and facilitate use by minors. If cannabis products were made legally available we could expect them to be offered as an alternative intoxicant at cocktail parties and other social gatherings. Regular supplies would undoubtedly be kept on hand in just as casual a way as alcohol is today. Moreover, where necessary, minors would always be able to find persons of age to obtain supplies for them. We believe it is illusory to think that conditions of regulated sale would seriously restrict the access of minors to the drug. We think the only reasonable assumption is that there would be wider availability to minors under conditions of legal sale to adults than there is under conditions of criminal law prohibition.

Despite the fact that there continues to be widespread availability of cannabis under conditions of criminal law prohibition there can be no doubt that the criminal law creates risks and difficulties for traffickers. These are reflected in the fact that there is relatively less marijuana in this country than there is in the United States. With marijuana from Mexico, which is still the main source, there are two borders to cross or to circumvent. Marijuana is bulky and difficult to conceal. Yet because of its potency in relation to weight—generally between .5% and 1% THC—it is necessary to move very large amounts of it. Profits, especially at the lower levels of the distribution system, are comparatively small in relation to the risks involved. For these reasons there is proportionately much less marijuana smuggled into Canada than into the United States and a much greater concentration on the smuggling of hashish, which is more compact, has approximately five to 10 times the potency of marijuana per unit of weight, brings a proportionately higher price, and can be smuggled into Canada from overseas sources via boat, airplane and mail. Thus while the sources of marijuana in the world are virtually unlimited and uncontrollable, since it may be cultivated anywhere, the difficulty of moving it in sufficiently profitable quantities to justify the risk is a severe limitation on the amount which may be brought into Canada under conditions of vigorous law enforcement.

It is uncertain how far domestic cultivation contributes to the supply of marijuana in Canada but there is reason to believe that it is increasing in importance. Convictions for unauthorized cultivation of marijuana have been increasing, as also have seizures of marijuana plants. In 1970 there were a total of 43 convictions for cultivation of marijuana, and in 1971, 58, as compared to a total of 19 in the whole of the three years 1967 to 1969 inclusive. The R.C.M. Police report seizures of 26,431 marijuana plants during the fiscal year 1970–71 and 92,978 up to the end of October, 1971 of the fiscal year 1971–72. This shows a very marked increase in law enforcement against cultivation, which presumably reflects the increasing importance that the police attach to domestic cultivation as a source of domestic consumption. Apparently there is little doubt now that a marijuana of acceptable potency can be grown anywhere in Canada. It can even be grown indoors. It

is too early to assess the long-term implications of this for law enforcement, but obviously they may be quite serious.

The situation at present appears to be that in most parts of the country marijuana is not very plentiful, and certainly not available in quantities that would permit a very large number of people to support heavy, regular use. In these areas, more hashish than marijuana is used. Hashish is easier to smuggle than marijuana but more difficult, because of the relative bulk, than heroin. Hashish is brought through customs by individuals on their person or in their luggage after arrival by plane or boat, or is sent through the mails, or is brought into the country in large quantities through various stratagems, such as air-drops off the coast, by organized criminal enterprises. Vigorous enforcement by police and customs officials can make the smuggling of hashish a very risky undertaking. Despite the fact that large quantities are obviously entering the country, there is reason to believe that criminal law prohibition imposes some limitation on availability. As the figures for seizures provided by the R.C.M. Police indicate (see Table 3 in Chapter 3), the total amount of hashish seized has been steadily increasing. On the basis of relative THC potency (between five and ten times as potent as marijuana), hashish represents a very high proportion of the total amount of cannabis seized.

CONTROL OF QUALITY AND POTENCY

The chief benefits of administrative regulation are an assured supply which one can obtain without having to engage in illegal activity, stable price and assured quality. The last is probably the most important element of effective control that can be achieved through administrative regulation. Prohibition reduces availability and forces prices to levels which may discourage use but leaves quality to be determined by the illegal market.

In the case of cannabis, quality is not really a major issue. At any rate, it is not the issue that it is in the case of the "chemicals", where there is not only fraudulent but dangerous adulteration. Cannabis is a natural product. There has been some evidence of misrepresentation and adulteration by non-psychoactive impurities, but little evidence of adulteration that presents dangers. Cannabis is generally what it purports to be. Most of it is of good quality. The need to control quality in the interests of safety is not a major issue, as it is in the case of alcohol. Arguments in favour of legalization based on the desirability of quality control are really more applicable to the more dangerous drugs; because of their higher cost, there is a greater incentive to adulteration, and because the process of adulteration is a chemical one there is a greater possibility of the introduction of dangerous ingredients.

Although there would necessarily be quality control, the chief object of product control in an administrative regulation of cannabis would be control of potency. Advocates of "legalization" assume that there would be a selection of products for legal distribution, and that by a control of potency or THC concentration, there would be an attempt to restrict consumption to moderate dose levels. The fallacy in this assumption is that the dose level can always be increased by increasing the quantity of the product which is consumed. Thus, not only would fixing a moderate concentration of THC per

unit of weight in the legally available product or products not prevent people from achieving the dose level they desire by regulating the quantity consumed, but it might drive them to seek more potent products on the illicit market if it had the effect of making such a dose level too costly or inconvenient to attain.

If cannabis were legalized we would not escape the necessity of using the criminal law. We would still have to use the criminal law to suppress the distribution of cannabis products outside the legal system, and particularly their distribution to minors. We would also have to prohibit cultivation. It is far from clear that there would not continue to be a significant illicit market in products of greater potency than those available on the legal market. This is particularly true if a decision were taken to legalize marijuana but not hashish.

Most advocates of legalization of cannabis contemplate that it would be confined to marijuana. Indeed, it is argued that the legalization of marijuana would reduce the consumption of hashish. It is felt that any significant increase in the effectiveness of law enforcement against marijuana is likely to be reflected in an increase in the use of hashish. This is regarded by most as a serious consequence in view of the greater potency of hashish.

There is some uncertainty as to the importance in practice of the difference between marijuana and hashish. Most commentators observe that while hashish is five to ten times as potent in THC concentration as marijuana, most users in practice adjust the quantities consumed to achieve approximately the same 'high' or level of intoxication with both. However, there seems to be a general agreement that hashish is more likely to lead to excessive use than marijuana, and it is noteworthy that the accounts of adverse psychological reactions in other countries have generally involved the use of hashish. There is also general agreement that the ingestion of hashish involves special hazards of overdose and adverse reaction, although this mode of administration does not yet appear to be common in Canada.

In Canada the use of hashish is now firmly established as the dominant form of cannabis use. The question is whether users could be enticed away from hashish by the legalization of a moderate form of marijuana, or whether a form of hashish would have to be legalized as well. We think it would be useless to legalize marijuana without hashish. We think that legalizing marijuana would introduce many people to the drug who are not using it now, but that it would not dissuade people who have acquired the habit of hashish from continuing to seek hashish. We believe there would continue to be a thriving illicit market in hashish. The fact is that tolerance may play a more important role than was previously thought in the development of levels of cannabis use. There now tends to be more agreement that tolerance develops to high cannabis use with time. In our opinion tolerance will play a part in gradually increasing the levels of cannabis use by regular users in North America until they approximate more closely the dose levels established in other countries. Hashish, because of its greater potency per unit of weight, is obviously a more convenient and rapid response to the requirements of tolerance than marijuana. We believe that it is the relationship

between tolerance, potency and excessive use that makes hashish both attractive and dangerous in the long-run.

One advocate of legalization of marijuana has argued as follows:

A licensing system, however, can exert pressure away from stronger drugs. So long as marijuana of sufficient potency is available, even though it is not perhaps so strong as desired, the preference for legal and convenient drug purchasing will incline users toward the use of the more available rather than the stronger drug. Our experience during Prohibition illustrates this. During the period from 1920 to 1933 there was a movement toward the use of more powerful alcoholic drinks such as gin and bourbon and away from the less powerful beer. This was in great part a consequence of the fact that the higher value per gallon of the stronger drinks make them more economic for boot-leggers to produce, transport, and sell. Interestingly, since the repeal of Prohibition, the ratio of hard-liquor sales to sales of beer has dropped.

Indeed, once we see the issue as to which is the better way to arrest the spread of hashish—licensing or forbidding its principal and most logical competitor—the answer becomes fairly clear. [Kaplan, *Marijuana—The New Prohibition.*]

The fallacy in this argument is that under liquor licensing the hard liquors are legally available to satisfy the demand for them, and this demand is very high, regardless of the amount of beer that is consumed. If the analogy were to have any value we would have to consider the effect of a licensing system that was restricted to beer only, and left hard liquor under a criminal law prohibition. It is a virtual certainty that an illicit market in hard liquor would continue to flourish. Obviously, where all forms are under criminal law prohibition, there will be an inevitable tendency to concentrate trafficking efforts on those forms which are most profitable in relation to risk. But it does not follow from this, if the most moderate forms are legalized, that trafficking in the more potent forms will cease if there continues to be a significant demand for these more potent forms.

For reasons already indicated, particularly tolerance and the likelihood of a steady increase in the dose level sought by regular, heavy users, we are convinced that there would continue to be a sufficient market for hashish to support a large volume of trafficking. Either that, or there would be efforts to convert the moderate substance that was legally available into more potent concentrations. Regular, heavy users are not going to smoke several mild cigarettes in succession to achieve what they can achieve much more quickly, and with less wear and tear on the respiratory system, by a fifth the weight using hashish. And in any event, even if potentially heavy users were disposed to remain with the legally available marijuana cigarette, they could increase their dose by increasing the number of cigarettes they smoked. Either way, the legal availability of a moderate form of marijuana cigarette would offer no assurance of a control on the total amount consumed on a single occasion or the total dose level which heavy users could attain. The same is true of beer. We know that a high level of intoxication can be achieved with beer, and that much alcoholism is attributable to the consumption of beer, as it is to the consumption of wine. It simply takes greater quantities than in the case of hard liquor; it is a question of convenience and what one might call

digestive preference—some people find the ingestion of large quantities of fluid uncomfortable.

It is completely illusory to think that we can effectively control quantities consumed, and dose levels attained, by a licensing system which provides a product with a specified potency per unit. Everything depends on the number of units or total amount of the product that is consumed on each occasion. What can be done by such a system is to assure that people know the potency of what they are consuming. They are able to make a graduated use of the drug, and they are not obliged to consume a unit of such potency as to risk overdose. This is the great danger with the ingestion of drugs. There is no way of titrating or adjusting the dose, if the potency of the drug turns out to be greater than suspected. Once the drug has been ingested there is no way of avoiding its full impact. This is one of the dangers with LSD and with the ingestion of hashish. But cannabis smokers may always stop at the level of intoxication which is acceptable to them. In the case of products which are smoked there is much less danger of falling unwittingly into overdose so that this argument in favour of legalization of a cannabis product of standard potency per unit is not as weighty as it would be for drugs which are ingested.

There is always a possibility, however, that if concern increases about the possible effects of the smoking of cannabis on the respiratory system, there will be increasing resort to the ingestion of cannabis products. This could have very serious consequences without units of standardized potency and widespread knowledge about effects and prudent use. Since, however, cigarette smokers appear to be undeterred by the impressive evidence of the dangers of smoking, it is likely that smoking will continue to be the preferred mode of administration of cannabis.

THE CONTROL OF DEMAND

Whereas we believe that the criminal law prohibition against trafficking can have a significant impact upon availability, at least in comparison with administrative regulation, we believe that the prohibition against simple possession has a much less significant impact upon demand.

The essential benefit to be derived from an application of the criminal law is the extent to which it prevents the behaviour to which it is directed. This involves a consideration of the factors which contribute to deterrence, or compliance with the criminal law, and the extent to which they are operative in a given case. Deterrence (which is not effected by actual physical restraint, as in the case of imprisonment or other deprivation of liberty) is basically a function of one or more of the following factors: the sense of moral obligation and voluntary compliance induced by the mere command of the law and its stigmatization of certain conduct; the risk of detection of a violation of the law; the likelihood of conviction, if caught; and the likely consequences of conviction—that is, the likely severity of the sentence and the other effects of a criminal conviction and record, including the effect on prospects for employment. Apart from the actual penalty imposed there is the fear of stigmatization, humiliation or degradation. This, however, is related, in some measure, to the moral authority of the law and the manner in which people

perceive the criminal law process and its results with respect to the particular offence.

It is impossible to determine with any certainty or precision how far a criminal law is having deterrent effect. Our continuing resort to such laws, with the severe costs for individuals which they entail, is based on the assumption that they have deterrent effect, so that we must assume that a particular criminal law is having such an effect, in the absence of convincing proof or arguments to the contrary. We cannot put in question the assumption which underlies the whole of our criminal law. Moreover, the consequences of criminal law stigmatization and punishment for the individual are such that it is wholly reasonable to assume that the criminal law acts as an effective deterrent for the vast majority of people who might otherwise be tempted to engage in the conduct which is prohibited.

The law depends for its efficacy on a substantial measure of voluntary compliance out of a sense of moral obligation. The vast majority of people comply with the law because it is the law. To command this respect and voluntary compliance in a sufficient measure the law must strike the majority as a reasonable one, or at least it must not strike them as so unreasonable as to offend their sense of justice. Opinions will differ widely throughout the population as to the wisdom of a particular law, but the overwhelming majority will support it so long as they do not consider it to be outrageous.

It is said by many that the law against cannabis has lost much of its deterrent effect because it does not command widespread respect. It is difficult to assess the weight of this opinion. Certainly, an increasing minority would appear to have little respect for it. For this minority, the criminal law prohibition against cannabis does not have persuasive effect merely by virtue of its existence. It does not command respect. Any deterrent effect which it has with this minority must rest on fear of detection and conviction. This fear is necessarily proportionate to the actual risk of such consequences, and the risk depends upon how effective law enforcement can be in this field.

It is clear that the risk of detection of simple possession of cannabis, for most of the using population, is relatively slight. Use is too widespread, and the methods required for detection too unacceptable with respect to most of the using population to make it possible to enforce the law in any but a haphazard and necessarily discriminatory manner. Many, if not most, of the cases of simple possession are uncovered by accident in the course of some other aspect of law enforcement. Apart from the accidental discovery of possession, law enforcement appears to be concentrated against certain well-identified and highly visible centres of drug use and distribution. There are certain populations which are relatively immune from systematic enforcement in their normal places of occupation and residence, although they may be caught by accident when out of their normal environment. If people are careful not to be in possession in public places where they may be confronted by the police for one reason or another they are relatively immune from detection. It would be wrong to suggest that there is a conscious policy of discrimination in the enforcement of the law; it is simply that the extent and patterns of use, the available manpower, and the difficulty of detection, where

there is no complainant, do not permit anything more than a very spotty and haphazard effort.

The use of cannabis in private is generally speaking beyond the effective reach of law enforcement. There will no doubt continue to be cases in which the police will break into dwellings to surprise individuals in possession of cannabis, but because of the unpopular nature of this kind of law enforcement it is bound to be used with increasing reluctance. It will simply not be used, as a general rule, against the average citizen. A real fear of being discovered in the private use of cannabis could only be developed and maintained by using the methods of a police state. It would require very large numbers of police, pressure on vast numbers of people to act as informers and ruthless use of the powers of search. Obviously, the society could not tolerate it. Even in a police state, such methods can only be invoked to suppress activity that can plausibly be presented as threatening the security of the state.

One measure of the effectiveness of law enforcement against simple possession is the number of convictions in relation to the estimated number of users. Convictions for simple possession of cannabis rose from 431 in 1967 to 5,399 in 1970. In 1971, there were 8,389. These figures reflect an increase in law enforcement effort but the total number of convictions still falls well below one per cent of a conservative estimate of the total number who have used cannabis in Canada. As a proportion of those who are estimated to have been actually using cannabis in 1970 and 1971, and of certain populations of users, the percentages are, of course, somewhat higher. For example, the total convictions for simple possession of cannabis in 1970 would be about one and one-half per cent of the total of 354,000 Canadians who are estimated to have been using cannabis in 1970, and the total of approximately 4,000 convictions of persons between the ages of 18 and 25 in that year represent approximately eight per cent of the total of 48,000 university students who are estimated to have been using it in that year. This, however, would not represent the actual risk of conviction in this population of users since the total number of convictions in this age group is by no means limited to this category of person. Such statistics as we have on the occupational categories of persons convicted for the simple possession of cannabis during the years 1967 to 1969 inclusive indicate that students comprised the largest stated group, averaging between 20 and 23 per cent in the country as a whole, but varying considerably from one province to another. There was, however, a large "Not Stated" category in these years which may have contained a significant number of students. Unfortunately, there are no such statistics available for 1970 and 1971. In any event, on any basis of calculation the risk of conviction for simple possession of cannabis in any one of the using populations would appear to be very low.

On the other hand, this does not necessarily reflect the extent to which the law may be having deterrent effect. In our surveys a relatively small proportion of non-users have stated that the law or the fear of arrest were reasons for not using, but the actual numbers affected are quite considerable. It is also of interest that the legal status of the drug deterred more people than the actual fear of arrest, reflecting the fact that many people are influenced by the

mere existence of the law, regardless of the actual risk of detection. Twenty-six per cent of high school students who had not used drugs said they had not done so because of the law.

To sum up, we would say that the prohibition against simple possession has relatively little deterrent effect by virtue of the risk of detection and prosecution. For certain people its stigmatization of the conduct probably has a deterrent effect. Such people respect the law, no matter what it is. It is likely that most of them would be just as deterred if there was no longer a prohibition against simple possession, but there remained a prohibition against distribution. It is likely that they would be disinclined to deal with an illegal market. They are not prepared to involve themselves in contact with people who may be under police surveillance or who may be prosecuted for selling to them, with attendant unfavourable publicity to themselves. For such people there would be a serious stigma attached to being detected in dealings with traffickers, even if there was no criminal liability. Many of the same people would likely try the drug out of curiosity if its distribution were made legal.

For significant numbers of users who make the law relatively ineffective as a means of controlling demand, the law does not have moral authority. Its stigmatization has no effect on their conduct.

THE EFFECT OF A CHANGE IN THE LAW ON THE PERCEPTION OF HARM

The difficulty here is that we do not start with a clean sheet. We are not choosing for the first time what would be a sensible policy with respect to cannabis. For better or for worse the legislator has taken a firm position on the subject, and now the issue is whether there should be any retreat from this position. In the course of our inquiry several witnesses expressed the fear that any liberalization of the law would give people the impression that there was nothing to fear from cannabis and would encourage the use of it. Such people would not insist that the present law is satisfactory in every respect. They do not say that the present approach is the one they would adopt if the question as to whether cannabis should be subject to some controls was coming up for the first time. They do say, however, that the present legislative characterization creates a certain impression of its relative potential for harm, perhaps an exaggerated one, but that a significant alteration of this characterization may give an equally erroneous impression in the other direction.

Within certain limits we do not believe that a change in the law need have an adverse effect on a proper appreciation of the caution with which we believe cannabis should be treated. To begin with, the present legal characterization of cannabis is simply not believed. People are not misled by the inclusion of cannabis in the *Narcotic Control Act* into believing that its effects are as harmful as those of heroin. The thoroughly mistaken nature of this characterization is now well and generally understood. There is a growing recognition in official circles that the assimilation of cannabis to the opiate narcotics in the *Single Convention on Narcotic Drugs 1961*, and in domestic legislation, undermines the credibility of public policy in the drug control field. Many nations, including the United States and Great Britain, have

acknowledged this by changing their whole approach to legislative classification of the drugs. While the *Single Convention* groups cannabis with the opiate narcotics it does not insist that it be given identical treatment in the law of the member states. The *Single Convention* has certainly been responsible for reinforcing the erroneous impression that cannabis is to be assimilated to the opiate narcotics but it does not prevent domestic legislation from correcting this impression. Because the present classification and legislative treatment of cannabis is so generally recognized to be erroneous and indefensible, any change in it which corresponded more closely to the facts could be expected to command much more respect and careful attention, and might well have the opposite effect of that which is feared by many: namely, to lead people to treat cannabis more seriously, if that is what the facts indicate.

There are limits, however, to this line of reasoning. Any significant change in the law is going to convey some acknowledgement of the relative seriousness of the effects of cannabis. The whole public debate concerning cannabis has turned on the question of whether it is harmful. There has, of course, also been controversy as to the proper legislative approach to it, assuming it to be harmful. The perception of harm and the proper legislative approach are for the overwhelming majority inextricably bound up together. If we are not mistaken, it is only a relatively small minority who see the issue as one of principle, regardless of harm.

We believe that a decision to make cannabis legally available, and to a lesser extent, a decision to repeal the prohibition against simple possession, would inevitably convey an impression that cannabis was considered to be less dangerous than official policy had previously given people to understand. In the case of a repeal of the prohibition against simple possession this impression would be offset in substantial measure by the retention of a prohibition against distribution.

THE COSTS OF APPLYING THE CRIMINAL LAW TO THE DISTRIBUTION AND USE OF CANNABIS

The costs of the criminal law prohibition of cannabis which are generally referred to include the following: (1) the effect of criminal conviction, particularly on young people; (2) encouraging the development of an illicit market, with possible involvement of organized crime; (3) obliging people to engage in crime or at least to deal with criminal types to supply themselves with the drug; (4) exposing people to other, more dangerous, drugs by forcing them to have contact with traffickers who handle a variety of drugs; (5) encouraging the development of a deviant subculture; (6) undermining the credibility of drug education, and in particular, information about more dangerous drugs; (7) the use of extraordinary methods of enforcement; (8) creating disrespect for law and law enforcement generally; (9) diverting our law enforcement resources from more important tasks; and (10) adversely affecting the morale of law enforcement authorities.

Some of these costs are inherent in the criminal law process and some are special to the criminal law prohibition of cannabis.

The effect of a criminal conviction upon young lives. The first, and probably

the most serious, of the special costs involved in the application of the criminal law to the distribution and use of cannabis is that the law falls most heavily upon the young. In 1970 and 1971 over 50 per cent of those convicted of the simple possession of cannabis and only a slightly smaller proportion of those convicted of trafficking offences were under the age of 21. In both years over 85 per cent of those convicted of all offences were under the age of 25.

It is particularly serious that several thousand young people should suffer the stigma and other consequences of arrest, trial and criminal conviction. Even if conviction does not result in imprisonment it can still have very serious consequences by its effect on vocational opportunities, the right to travel and other rights and privileges. There is also the harsh effect of contact with the criminal law process. The effect on the offender's family must also be taken into account. The mental suffering which these events can produce in parents is a very substantial cost. Further, there is the understandable sense of injustice at being the one who is unlucky enough to be caught. There cannot be any systematic attempt to enforce the law, and large numbers remain relatively immune from detection.

Even where there is provision, as there is under the present law,^[b] for the granting of a pardon after a certain period of time, the knowledge which a lot of people invariably possess of a conviction and the knowledge which can be obtained by interested parties through careful investigation cannot be eliminated.

The cost of criminal law conviction is also to be measured not just by the stigma and future consequences for employment and other opportunities, but also by the severity of the penalties imposed. The maximum penalties under the *Narcotic Control Act* for offences involving cannabis are grossly excessive. They are out of all proportion to the harm which could possibly be caused by cannabis. Moreover, they are excessive by comparison with those of most other nations. The maximum penalty of life imprisonment for the trafficking offences is much more severe than the penalty in other western nations.^[c]

It is clear that the Canadian penalty structure with respect to cannabis developed with a view to the opiate narcotics and without any anticipation of the social problem it would cause in the late 1960s. When Parliament adopted the present maximum penalties in 1961, the perception of cannabis which they had before them was that reflected in the observation of the Special Senate Committee of 1955 on the narcotic traffic that it did not as yet present a problem. (See History in Chapter 5.)

A conspicuous aspect of the extreme severity of the Canadian penalty structure with respect to cannabis offences is the mandatory minimum penalty of seven years' imprisonment for importing or exporting. (See Chapter 5, Prohibitions and Penalties.) This was enacted in 1961 in response to a recommendation of the Special Senate Committee, but again the Committee and the Government were undoubtedly thinking mainly of the drugs which are true narcotics. In fact, virtually all of the cases of importing or exporting in recent years have involved cannabis. The impact of this very severe law has fallen almost entirely upon this class of trafficker, although it may be presumed to have had some deterrent effect with respect to importing or exporting of the narcotics. In 1970, 26 out of the 28 convictions for importing or

exporting under the *Narcotic Control Act* involved cannabis, and in 1971, 22 out of 26. In 1971, 16 of the convictions involving cannabis carried sentences of between seven and eight years, and six of them carried sentences of ten years and over. Thirteen of the cases involved persons between the ages of 18 and 25. As indicated in Chapter 5, there is reason to believe that the authorities only resort to this offence in what they consider to be very serious cases, but there are still a number of young people who come under this draconian law, which leaves the judges no discretion and cannot be justified by the facts concerning cannabis.

The maximum penalty of seven years' imprisonment for cultivation is also very severe, since it makes no distinction between cultivation for purposes of trafficking and cultivation for purposes of one's own use.

Another aspect of the severity of the penalties for the offences of importing or exporting, trafficking, possession for the purpose of trafficking and cultivation, at least insofar as cannabis is concerned, is that they do not offer the Crown the option of proceeding by summary conviction rather than indictment. This option exists with respect to the trafficking offences involving controlled drugs and restricted drugs under Parts III and IV of the *Food and Drugs Act*, and there is no logical reason why it should not apply to the offences involving cannabis. There is no reason, for example, why the penalty structure should be more severe for cannabis than LSD. Indeed, on the basis of potential for harm, it should not be as severe.

Under the law, as it presently stands, the courts do not have the right to impose a fine in lieu of punishment in trafficking cases. This results from section 646(2) of the *Criminal Code*, which provides that "An accused who is convicted of an indictable offence punishable with imprisonment for more than five years may be fined in addition to, but not in lieu of, any other punishment that is authorized." The statistics suggest that there are cases of trafficking offences in which only a fine has been imposed, but this would appear to be an exercise of judicial discretion that is not permitted by the present law. There have been decisions in which the courts of appeal have upheld an appeal from sentence on this ground. In our opinion this option should be open in trafficking cases to permit the courts to deal with the marginal cases which do not merit a policy of severity. The *Single Convention on Narcotic Drugs, 1961*, requires that "serious offences shall be liable to adequate punishment particularly by imprisonment or other penalties of deprivation of liberty", but trafficking offences exhibit a wide range of relative seriousness, and the permissible range of penalties should be sufficiently flexible to permit the courts to reflect significant distinctions.

As for the offence of simple possession, the maximum penalties, whether upon indictment or summary conviction, are completely unreasonable. They are out of all proportion to the potential for harm of cannabis or the overall effect which they may have upon demand. They give much too great a latitude to the judges and can be made to fall with great severity and injustice upon individuals whose cases exhibit circumstances, including a previous conviction, which appeal to judges as justifying a policy of severity. Because of the special nature of the law concerning cannabis—the very real doubts concerning the extent to which we are justified in continuing to use the

criminal law to attempt to suppress it—we do not think that particular weight should be attached to a previous record in imposing sentence in cannabis cases. They should be judged essentially on their own merits, and not invested with the seriousness which may carry over from other cases. It is using an offence about which there are reasons for serious misgiving to justify what amounts to further punishment for previous acts.

As will appear, we favour the abolition of the offence of simple possession, but we wish to make our position clear, that if it were to be retained in any form we would be strongly opposed to the retention of liability to imprisonment. We are strongly and unanimously of the opinion on the Commission that the simple possession of cannabis does not justify imprisonment in any circumstances.

It may be said that the severity of the law must be judged not by the maximum penalties on the statute book but by the manner in which the law is actually applied. Close to 80% of the cases of simple possession are disposed of by fine. Apart from importing or exporting, for which there is the mandatory minimum sentence of seven years, most of the sentences to imprisonment for trafficking offences involving cannabis are for periods under two years, and virtually all of them are under three years. In 1971 all sentences were under six years. It may be said that in these circumstances it is of no practical consequence that the law provides a maximum penalty of life imprisonment for trafficking offences and seven years' imprisonment for simple possession.

To this, certain things may be said in reply. First, there is no doubt that the maximum penalties on the statute book are intended to create an impression of relative seriousness which influences the sentencing process. The judges have said as much. (See, for example, *R. v. Simpson*, [1968] 2 O.R. 270; *R. v. Perrin*, (1971), 14 C.R.N.S. 24.) Secondly, in the light of the wide disparity in the approach to sentencing which our study reveals, the present penalty structure gives the judges too large a discretion. In spite of the overall tendency towards more moderate sentencing in respect of cannabis, there are still cases of exceptional severity. If the overwhelming opinion, as reflected by the sentences, is that these maximum penalties are neither necessary nor appropriate, it is wrong in principle that they should be left on the statute book as a justification of severity by judges who are disposed to take that view. Finally, it would give the law a greater appearance of rationality, which has a bearing on the credibility and respect which it can inspire, if the maximum penalties more closely reflect the relative seriousness of the offences.

Another cost of the laws against cannabis is the extent to which there must be a departure from the ordinary rules respecting the burden of proof. This arises in the case of the offence of possession for the purpose of trafficking (see Chapter 5). This offence, which was introduced into Canadian law in 1954, has played an important role in law enforcement against trafficking. It accounted for over 40% of the convictions for trafficking offences in 1970 and over 50% of them in 1971. It is considered to be necessary because of the difficulty of apprehending persons in the act of trafficking or otherwise making the necessary proof of this offence. Similar provisions have been

adopted in the United States and Great Britain. The disturbing aspect of the offence is the burden of proof which is cast upon the accused once the Crown has proved the fact of possession. As indicated in Chapter 5, since the decision of the Supreme Court of Canada in the *Appleby* case it would appear that it is no longer sufficient for the accused to raise a reasonable doubt concerning his intention to traffic; he must rebut the presumption by a preponderance of evidence or proof which carries on a balance of probabilities. This places a heavy burden on the accused. We shall have a recommendation to make on this point.

Encouraging the development of an illicit market. There is no doubt that the criminal law prohibition of distribution encourages the development of an illicit market, where, as in the case of cannabis, there is a significant demand for the product. This is an inherent cost of the prohibition of distribution. It means that a certain number of people will be encouraged to engage in the crime of trafficking and to make a profit from it. There is little evidence of organized crime being involved in the traffic in marijuana, although there is some evidence of it in connection with hashish. It is a reasonable assumption that a profitable illicit market will eventually attract organized criminal elements.

Obliging people to engage in crime or at least to deal with criminal types to supply themselves with the drug. This also is an inherent or unavoidable cost of a criminal law prohibition of distribution. It must be recognized that even if the prohibition against simple possession were repealed many users of cannabis would continue to have their conduct criminalized since, as part of the process of supplying their own requirements, they would be dealing with traffickers in amounts that would involve them in some redistribution. This is the operating and economic reality of cannabis distribution.

Exposing people to other, more dangerous, drugs by forcing them to have contact with traffickers who handle a variety of drugs. There is no doubt a good deal of truth in this point. Distributors of cannabis, particularly at the lower levels of distribution, generally carry other drugs because of the relatively low profit to be made on cannabis at that level of distribution. Many professional distributors of cannabis also carry LSD and other psychedelic hallucinogens. Forcing users to have contact with them increases the chances of their being exposed to LSD. But even if cannabis were legally available, there would still be an illicit market in LSD which persons who wanted to try it could readily find. The use of cannabis itself, rather than contact with the distribution of LSD, is probably a more important step in the direction of LSD. Making cannabis legally available would not isolate people from contact with the illicit market in other drugs. From the point of view of influence, the important contacts are between drug users rather than between users and traffickers. Most users are initiated into new forms of drugs by other users. Interest in other drugs would not cease if cannabis were made legally available.

It is said that obliging users of cannabis to resort to an illicit market for supply forces them into a multi-drug-using subculture. Making cannabis legally available would not put an end to multi-drug use or the drug culture,

nor would it put an end to contact between users of cannabis and users of other drugs. Users would continue to talk about drugs and share drug experiences. They would continue to arouse each other's interest in new drug experiences. The drug culture is pervasive. The important and influential contacts are between users. There is a great amount of multi-drug use. It is impossible to wall off one kind of drug use by making the drug legally available. There is no guarantee that people will restrict themselves to that drug. The legal availability of alcohol is proof of that. It has not prevented a great amount of multi-drug use, involving contact with an illicit market.

Encouraging the development of a deviant subculture. The argument here is that by making conduct criminal we tend to make people deviant and encourage them to engage in criminal activity. The reasoning is that we give them a certain conception of themselves and they tend to fulfil it. The attitude is: if I am going to be treated as a criminal then I am going to act like one. To the extent that there is truth in this argument, it is a cost that is inherent in criminal law prohibition. We doubt that it is true of most cannabis users, who do not exhibit a general pattern of criminality or delinquency.

Undermining the credibility of drug education and, in particular, information about more dangerous drugs. It is said that the present legislative treatment of cannabis undermines the credibility of drug education generally. The argument is that if the authorities have been so misleading about cannabis there is no reason to believe what they say about other drugs. It is difficult to know how much weight to give to this argument. There is undoubtedly some force in it. It can be met, we think, by a more rational legislative treatment of cannabis; again, we do not think it is necessary to go to the extent of making cannabis legally available.

Some will no doubt argue that as long as cannabis is treated differently than alcohol there is bound to be a question about the basic honesty of the law. It is argued that it is illogical that the criminal law should be used to prohibit the distribution of cannabis, while alcohol, which is at least as dangerous, is made legally available. First of all, let us concede two things immediately. Alcohol is one of the most dangerous drugs, when used to excess, and from everything we know now it is probably considerably more dangerous than cannabis, if only for its capacity to produce strong physical, as well as psychological dependence. Secondly, the anomaly in the legal treatment of cannabis and alcohol is not logical, if the criterion is consistency. But there is no virtue in pursuing an unwise policy merely to be consistent. The argument of consistency—because alcohol has been made legally available cannabis should be made legally available—would apply to the non-medical use of all dangerous drugs, since few, if any of them, are more dangerous than alcohol when used to excess. It is alcohol which is the anomaly; not the other dangerous drugs whose distribution for non-medical use is prohibited.

The use of extraordinary methods of enforcement. Reference has been made in Chapter 5 to the extraordinary methods of law enforcement which must be resorted to because of the difficulty in detecting offences by reason of the fact that there is seldom, if ever, a complainant. The use of special methods of

search, undercover agents and informers, and police encouragement of offences makes the impact of the criminal law process in this field particularly unpleasant and generates considerable resentment. It also tends to bring the law and police into some disrepute. Commission researchers who engaged in participant observation of law enforcement in the drug field have concluded that such enforcement would be seriously handicapped if the police were deprived of these special powers and methods. It would appear, therefore, that they must be regarded as special costs inherent in the criminal law prohibition of the distribution and use of drugs.

Creating disrespect for law and law enforcement generally. There is no doubt that the law on cannabis has created for a significant number of youth a disillusionment with law and legal institutions, as well as the processes of government generally. They have been disillusioned by the obstinacy in maintaining the present legal policy with respect to cannabis despite the evidence that it is not nearly as dangerous as the opiate narcotics and probably not as dangerous as alcohol. They believe that there must be something perverse and profoundly hostile in the official attitude towards cannabis. The situation has been made somewhat more tolerable by changes in judicial attitudes which have reduced the severity of the law as actually applied in practice. But many youth regard the law concerning cannabis as exhibiting an irrationality which amounts to dishonesty. There can be no doubt that the law on the books is at extreme variance with the facts. We believe that much of the strong feeling about the law could be removed by a change that would bring it into closer conformity with the facts. We do not believe that it is necessary to go to the extreme position of making cannabis legally available to remove the essential basis for disrespect for law and governmental process that may be fairly attributable to the laws on cannabis. It is sufficient to introduce a greater measure of rationality into the law.

Diverting our law enforcement resources from more important tasks. There is no doubt that the law against cannabis makes a disproportionate demand upon the time of police, prosecutors and judges. It is already imposing severe strains upon the system. An all-out attempt to enforce the prohibition against simple possession would impose intolerable strains upon it. Indeed, we could not afford the personnel required for it.

Adversely affecting the morale of law enforcement authorities. There is no doubt that the law on cannabis and the methods which have to be used to enforce it have affected public attitudes, in certain segments of the population, toward the police. It may well be, moreover, that the difficulty and the controversy involved in enforcing the law against cannabis have had an adverse effect on police morale. On the whole, it has been an unpopular law, although the police have probably felt, with some reason, that they have had the support of the majority of the population. But there has been profound misgiving about the reasonableness of the law—the appropriateness of the scale of penalties. Young people have been highly critical of the law and strongly opposed to it. The law enforcement authorities have been increasingly conscious of the fact that while cannabis is classed with the opiate narcotics it is not the same thing at all. The law has lacked credibility even for many of those who have felt an obligation to support it.

THE BALANCE OF BENEFIT AND COSTS

The Commission is required by its terms of reference to make recommendations to the federal government as to what it can do alone or with other levels of government to reduce the problems involved in non-medical drug use. The use of cannabis is a problem but so also is the present use of the criminal law to suppress it. The attempt to enforce the prohibition against the simple possession of cannabis, as well as the prohibition against distribution, is bringing the criminal law to bear against thousands of young people with very serious consequences for their lives. The number of convictions for simple possession has more or less doubled each year, rising from 431 in 1967 to 8,389 in 1971. It may be expected to continue to increase on this scale if we persist in a policy of attempting to enforce a prohibition against simple possession, even in a somewhat haphazard and necessarily uneven manner. Apart from its impact on thousands of young lives, such a scale of law enforcement will place an intolerable strain upon our resources, taking up an increasing amount of the valuable time of police, prosecutors and judges. It is already overburdening the system very severely.

We do not believe that the known, probable and possible effects of cannabis, and the marginal effect which a prohibition against simple possession may have on availability, perception of harm, and demand, justify these costs of continuing to attempt to enforce it against greatly increasing numbers of users, most of whom are under the age of twenty-five. It is simply not a feasible policy in the long run. The number of individuals involved, the difficulties of enforcement and the allocation of resources required to process the required number of cases are all too great to make a thorough-going enforcement of the law against simple possession practicable. The law is able to reach less than one per cent of a conservative estimate of the total number of users. Thus it can have little impact by virtue of the fear of detection. At the same time, it has very serious consequences for those who are unfortunate enough to be caught. A law which can only be enforced in a haphazard and accidental manner is an unjust law. It falls with great unevenness upon the population of offenders.

No doubt there would be some cost in abolishing the offence of simple possession. It would probably lead to some increase in use and some change in the perception of harm of cannabis, but these may be offset in some measure by retention of the prohibition against distribution and by information designed to make people more cautious about the use of cannabis. Use is in any event very widespread and steadily increasing. We do not think that the marginal effect which a prohibition against simple possession may have on demand justifies the costs of applying it against thousands of young people. Those we are most concerned about are the least likely to be impressed by the law, particularly by its moral command. Those who are impressed by its moral command, quite apart from the actual risk of detection, are likely to be prudent in any event, and probably will be as deterred by the disapproval implied in the prohibition against distribution and by reluctance to become involved in contacts with an illicit market. In any event, we feel that the costs of continuing to enforce the prohibition against simple possession, even on a scale required for a token effort, are such that we must accept the risks of

some increase in use and some adverse effect upon perception of harm. We do not consider the latter possibility very serious, however, since it is clear that the law has had no serious effect on this issue. It has been too obviously at variance with the facts to carry any credibility. The actual perception of harm of cannabis is now so different from that which the law would suggest, that any change in the law could only be recognized as a belated recognition of the facts. It would not be interpreted as the law saying something new and hitherto unknown about cannabis, but the law being obliged to acknowledge what is actually known. The prohibition against distribution would serve to emphasize the continuing concern of the state.

We believe that on balance the marginal effect which a prohibition against distribution can have on availability justifies the costs of continuing to apply it. We recognize that numbers of young people will continue to be involved in trafficking if only as part of the process of supplying their own requirements. But the act of making cannabis available is more serious in our opinion than the act of using it, since it involves facilitating use by others, and there are fewer people affected by the application of the criminal law. In other words, a relatively more effective impact can be made on availability than upon demand with much fewer people adversely affected by the law. The benefit is proportionately greater in relation to the cost.

Certain changes in the law respecting distribution should be made, however, to make the law more reasonable in relation to the relative seriousness of the offence, while at the same time maintaining its essential deterrent effect, and also to give the courts more flexibility to deal with significantly different kinds of trafficking. The mandatory minimum sentence of seven years' imprisonment for importing or exporting should be removed. The maximum penalties for all distribution offences should be reduced to reflect the upward limits of the present range of sentences, as indicated in Chapter 5 and Appendix A. There should be the option to proceed by way of indictment or summary conviction in all cases. Cultivation should only be punishable if it is for the purpose of trafficking. To reduce the impact of the law against trafficking on the young to what is reasonably necessary, there should be excluded from the definition of trafficking the giving without exchange of value by one user to another of a quantity of cannabis which could reasonably be consumed on a single occasion. It is necessary to retain the offence of possession for the purpose of trafficking, with a burden of proof upon the accused, but it should be sufficient for the accused to raise a reasonable doubt concerning his intention to traffic.

The elimination of the offence of simple possession, the restriction of the offence of cultivation to cases where it is cultivation for the purpose of trafficking, and the exclusion of sharing of cannabis from the definition of trafficking may all entail the additional cost of an adverse effect upon the effectiveness of law enforcement against trafficking, but we believe that it is a cost which we must accept in view of the costs of pursuing a different policy on these issues.

In our *Interim Report* we said that we wished to give further consideration to the relationship of the offence of simple possession to effective law enforcement against trafficking. We have done this to the best of our ability, but we

are not really able to throw more light upon the issues than we were at the time of the *Interim Report*. There is no empirical way of testing the truth of the assertion that an offence of simple possession is essential to effective enforcement against trafficking. There is no offence of simple possession for the controlled drugs (the amphetamines and barbiturates), but it is impossible to estimate the effect which this has had on the effectiveness of law enforcement against trafficking in these drugs, particularly in the case of 'speed'. It is also impossible to compare the relative effectiveness of law enforcement in the case of controlled drugs and cannabis, since there is such a variety of different factors involved. The police insist, however, that they have been greatly handicapped by the lack of an offence of simple possession for controlled drugs. In further submissions to the Commission since its *Interim Report* the R.C.M. Police have stated that an offence of simple possession is essential to the control of availability. The chief utility of the offence of simple possession in relation to trafficking is that it reduces the risk of proceeding on a charge of possession for the purpose of trafficking, since if the Crown fails to prove that charge, it can fall back on the offence of simple possession, and it enables the authorities to reach offenders whom they know, but cannot prove, to be engaged in trafficking. We do not think that this marginal utility in relation to the offence of possession for the purpose of trafficking justifies the costs of retaining the offence of simple possession. Nor do we think it is likely to have much deterrent effect on traffickers, since they are unlikely to be impressed by the scale of penalties which we would judge to be acceptable for the offence of simple possession if it were to be retained. In other words, it would not be acceptable to make the offence of simple possession subject to sufficiently severe penalties to deter trafficking.

SUMMARY STATEMENT OF CONCLUSIONS AND RECOMMENDATIONS

1. Although research has not clearly established that cannabis has sufficiently harmful effects to justify the present legislative policy towards it, there are serious grounds for social concern about its use, and this concern calls for a continuing policy to discourage its use by means which involve a more acceptable cost, than present policies, to the individual and to society.
2. The focus of our social concern should be the use of cannabis by adolescents, and the principal object of our social policy should be to restrict its availability to them as much as reasonably possible by the methods which appear to be most acceptable on a balance of benefits and costs.
3. The only policy which can impose a significant restriction on availability is a prohibition of distribution. Under a system of administrative regulation or licensing, availability would be virtually unrestricted. A policy of making cannabis available to adults would have the effect of making it more available to minors. This is the lesson of our experience with alcohol. It would also make cannabis appear to be relatively harmless. Further, there is no reason to believe that we could effectively control potency and encourage moderate use by a system of administrative regulation or licensing. People will consume the quantities they require to achieve the desired level of potency or they will seek more potent forms, if necessary, in the illicit market. Moreover, our present knowledge about cannabis

would not permit a policy of legal availability that could be accompanied by suitable assurances as to what might constitute moderate and relatively harmless use.

4. The costs to the individual and society of maintaining a prohibition of distribution are severe but they are justified by the probable effect of such a prohibition on availability and perception of harm, in contrast to the likely effect on both of a policy of legal availability.
5. The costs of a policy of prohibition of distribution are only acceptable, however, if the possible penalties for illegal distribution are reasonable in relation to the relative seriousness of the offence. Having regard to the potential for harm of cannabis in relation to other drugs, the extent to which young people are involved in its distribution, and the general level of penalties in other countries, the present penalty structure for the illegal distribution of cannabis is grossly excessive. In some cases it does not leave the courts sufficient discretion, and in others it leaves them too much.
6. We recommend the following changes in the law respecting the illegal distribution of cannabis:
 - (a) Importing and exporting should be included in the definition of trafficking (as they are under the *Food and Drugs Act*), and they should not be subject to a mandatory minimum term of imprisonment. It might be appropriate, however, to make them subject to somewhat higher maximum penalties than other forms of trafficking.
 - (b) There should be an option to proceed by indictment or summary conviction in the case of trafficking and possession for the purpose of trafficking.
 - (c) Upon indictment, the maximum penalty for trafficking or possession for the purpose of trafficking should be five years, and upon summary conviction, eighteen months. It should be possible in either case to impose fine in lieu of imprisonment.
 - (d) In cases of possession for the purpose of trafficking it should be sufficient, when possession has been proved, for the accused to raise a reasonable doubt as to his intention to traffic. He should not be required to make proof which carries on a preponderance of evidence or a balance of probabilities.
 - (e) Trafficking should not include the giving, without exchange of value, by one user to another of a quantity of cannabis which could reasonably be consumed on a single occasion.
7. The costs to a significant number of individuals, the majority of whom are young people, and to society generally, of a policy of prohibition of simple possession are not justified by the potential for harm of cannabis and the additional influence which such a policy is likely to have upon perception of harm, demand and availability. We, therefore, recommend the repeal of the prohibition against the simple possession of cannabis.
8. The cultivation of cannabis should be subject to the same penalties as trafficking, but it should not be a punishable offence unless it is cultivation for the purpose of trafficking. Upon proof of cultivation, the burden should

be on the accused to establish that he was not cultivating for the purpose of trafficking, but it should be sufficient for him, as in the case of possession for the purpose of trafficking, to raise a reasonable doubt concerning the intent to traffic.

9. The police should have power to seize and confiscate cannabis and cannabis plants wherever they are found, unless the possession or cultivation has been expressly authorized for scientific or other purposes.

CONCLUSIONS AND RECOMMENDATIONS

of

Marie-Andrée Bertrand

My colleagues have adopted a position of tolerance in the matter of use which represents a forward step compared to the existing attitude. However, their interpretation of the results of our inquiry does not lead them to recommend the legalization of cannabis distribution through federal-provincial agreement. Despite my esteem for the other members of the Commission and my respect for their point of view, I must dissent from the majority opinion. I recommend a policy of legal distribution of cannabis.

The preceding pages describe the effects of cannabis and the extent and patterns of its use. They establish that a large number of people have used cannabis—more than a million in Canada. Very few of them have ever required medical or psychological treatment as a consequence. Smoking marijuana or hashish generally produces no serious personal problems, nor does it result in criminality. The results of surveys also allow us to state that for the vast majority of cannabis users, curiosity and the search for pleasure have been the main motive force.

The facts on which a social policy with respect to cannabis can be based are summarized as follows:

- (1) At least one Canadian out of every twenty uses cannabis occasionally. Excluding people over 60 and under 6, the proportion is one out of every seven or eight. In some populations, every second person uses cannabis.
- (2) In the vast majority of cases, use does not give rise to serious psychological difficulties, to crimes or illness.
- (3) Cases of habitual and excessive use are exceptional.
- (4) For nearly all users, reported motives are: a desire to experiment, and a search for pleasure and escape.

PROHIBITION: EXPENSIVE AND INEFFECTIVE

In Canada, enforcement of the prohibition against cannabis use falls accidentally—almost randomly—on a very small proportion (about 1%) of offenders.

Traffickers are subject to more severe sanctions when arrested than are users; but the control of trafficking is not adequately effective, judging by the

amount of cannabis that is readily available. Canadians who cultivate the plant do so with little risk of arrest as long as they do not engage in any large-scale activity.

As for importing, the R.C.M. Police reported a number of very large seizures in the last 18 months. Unfortunately, it is difficult to estimate the proportion of importers affected by these arrests. But considering the quantities of cannabis in circulation, it would appear that law enforcement at this level is no more effective than in the case of domestic trafficking.

The very small number of arrests, compared to the numbers of users, traffickers or importers, is not the only consideration in the question of effectiveness. There is also the fact that not only has the legal position on cannabis failed to reduce use or trafficking, but evidence shows that these have become even more widespread than ever. In addition to being ineffective, law enforcement has been very costly. In fact, at least 10,000 to 12,000 arrests and 8,000 convictions have been made against users in the last 12 months. The Commission was told that breaking one network of importers took several months of work by police agents. The total cost to be considered would include time incurred by police and magistrates and, of course, detention costs.

THE NON-EDUCATIVE CHARACTER OF THE LAW

To have an educational impact, a law should be coherent and rest on basic principle. The most commonly invoked principle is that of social danger; thus, severe penalties and the use of law enforcement agencies are generally limited to acts causing a real and serious prejudice to others.

A more important factor underlying problems in the application of the law is the gradual change in opinion taking place among Canadians regarding the harmfulness of this substance. The evidence has been taken into account—cannabis is not an opiate, its use does not induce physical dependence. The earlier opinions of society have been challenged and modified. The attitudes of parents, teachers and police are changing—the R.C.M. Police leave the handling of cannabis matters, in most cases, to local police units. Moreover, in a number of cities, municipal police find it futile to look for cannabis users; most of the ordinary sellers are never bothered. In the summer of 1970, this more reasonable attitude even reached the office of the Attorney General in the federal Department of Justice; as a result the indictment procedure (for simple possession) could be replaced by summary conviction, under which penalties for simple possession might be lightened. However, the continued prohibition of cannabis has precipitated, among many users, a generalized disrespect for the law. If the laws regarding the use of cannabis are to be effective and have educative value they must be consistent with those laws regulating the use and sale of other drugs, such as alcohol, that have a potential for harm at least as great as that of cannabis.

ABSENCE OF CONTROLS ON PRICE, QUALITY AND POTENCY

Given the actual legislation, conjectures about the economics and the quality control aspect of cannabis distribution are rather futile. In fact, profits are not subject to taxes and price control. As for quality, the clandestine character of the transactions makes analysis and control impossible. Existing analytic data indicate that the various forms of cannabis available illicitly in Canada today vary in THC content over a wide range, and the user has no basis for estimating, in advance, the potency of these different preparations. Such unpredictable variability undoubtedly increases the likelihood of undesirable effects. Standard cannabis of consistent potency would enable the user to more easily anticipate the effects of use, and to learn to adjust the quantities consumed accordingly. These are some of the considerations which have led me to conclude, not only that the prohibition against possession should be removed, but that the distribution of cannabis should be organized legally.

THE HARM OF CANNABIS

What are the physical and psychic effects of cannabis? In an inquiry led by five individuals, assisted by a large number of investigators, it is inevitable that the interpretation of data will vary from one Commission member to another, from one investigator to another. This phenomenon applies particularly to the present instance: all the pertinent data are there before us, as before the legislators and before the Canadian public. But they will not be given the same relative weight.

I have understood and interpreted the results of the various investigations on the physical and psychological effects of cannabis as follows.

Effects on the Sensory, Cognitive and Psychomotor Functions

Several studies are cited in the previous pages—including those of the Commission—establishing that under doses sufficient to produce the level of intoxication typically sought, there is generally some acute alteration in perception and, often, an impairment in some cognitive functions, such as short-term memory. As for attention and vigilance, especially important in the handling of complex machinery, the two experiments carried out by the Commission (involving different tasks) lead to contradictory conclusions. It would appear that under certain circumstances a statistically significant impairment in performance may occur, but the practical significance of many of the test conditions involved is questionable and has not been determined.

With low doses, the great majority of effects which we have just mentioned are either non-existent or negligible, and often impossible to verify. Occasionally, low doses may improve capacity. It is difficult to establish significant effects on most measures. In discussing cannabis effects another variable must be taken into account: the experience of the subject in performing the task—whether under the influence of cannabis or not—may compensate for some of the negative effects. If the subject is not familiar with them, complicated tasks, requiring prolonged attention, are usually not done well under doses typically consumed by regular users.

With regard to psychomotor aptitudes, several variables must be taken into account: dose, sensory, cognitive and muscular requirements of the task, the subject's past experience with the test and his previous history as a cannabis user. The effects under these conditions are quite complex. In Commission experiments there was no indication that marijuana adversely affected response speed or reaction time. There was a perceptible deterioration in some aspects of tracking performance after absorption of the higher dose, but not with smaller quantities. Combined alcohol and cannabis use may modify psychomotor functions still more.

Is the ability to drive a vehicle diminished by cannabis? Will cannabis use, under natural conditions, result in increased traffic hazards? Let us remember, to begin with, that we have only laboratory experiments from which to judge, and it is particularly risky to extrapolate from experiments which cannot reproduce the very great number of variables of daily driving. The action of cannabis in this area is related to various effects on the perceptual, cognitive and psychomotor functions, each of which varies according to dose.

It has been shown that cannabis does not give rise to aggression. It seems that cannabis can impair certain driving abilities, but the relative impairment is related to dose and, probably, experience with driving when 'high' and other factors. Even if it is clear that driving while in a state of cannabis intoxication is a risk, and that one should avoid driving in this condition, it has not been shown that cannabis, under natural conditions, results in a serious increase in traffic hazards. What are the users' attitudes in this regard? Some say decidedly that they would not drive when 'high'—just as the majority refuse to drive when in a state of alcoholic inebriation, even if only slightly so. Other users say that they would drive, but more carefully. Some surveys report that users claim to have learned to compensate for their perceptual and psychomotor impairment. Some experimental support for this contention exists.

No one can look on with equanimity when someone drives a car or an aircraft while intoxicated, no matter what substance is consumed. Dangerous driving of any vehicle can have grave consequences. There is, however, no need to panic where cannabis is concerned. Let us remember, at the outset, that the Canadian penal code carries sanctions which permit prosecution of persons driving dangerously. In my opinion this is sufficient. Many other kinds of human conditions can never be measured on a Breathalyzer-type of instrument, but they nevertheless, at critical points, make the handling of any machine rather dangerous. The example of a quarrel between husband and wife when one of them is driving comes to mind, as do 'highway hypnosis', driver fatigue and alcohol 'hangover'. Furthermore, driving impairment can be produced by a variety of other drugs, commonly used both medically and non-medically, for which there are no convenient methods of detection.

Physical Effects

Cannabis apparently produces acute physiological effects of little general consequence: heart rate is increased, salivation and skin temperature decreased, and there is often a slight reddening of the eyes. Few other short-term effects have been reliably detected. It has been suggested that chronic

heavy use may have adverse effects on respiratory, cardiovascular, gastrointestinal, liver and neurological function, but such potential effects have not been documented in systematic controlled studies. Not one well-controlled study of chronic or sub-chronic cannabis use in humans has demonstrated any major chronic problems caused by cannabis. Cannabis has not been shown to be lethal in humans.

Amotivational Syndrome

Cannabis may engender apathy and indolence in some people, but, as we have seen, there is a great deal of controversy on this subject. The role of cannabis in this alleged syndrome is not clear, nor is the research adequate or conclusive. Among certain users who are truly without motivation and spirit, cannabis has not been established as the causal factor in the condition, nor has it been established that its use preceded the apathy.

Mental Health

Although scientists have not been able to agree on the concept of a "cannabis psychosis", and a large number of them refuse to accept it as a specific disorder, it sometimes happens that heavy dosage will trigger an acute psychosis. In North America, these incidents are exceedingly rare. According to David E. Smith, writing in 1968, adverse reactions to cannabis were extremely rare at the Haight-Ashbury clinic in San Francisco, where more than 30,000 patients, suffering from various drug problems, had been treated.

It is true that there are reports from non-industrial countries (often in the East) of psychoses and chronic behavioural disturbances in some long-term users, characterized by lack of ambition, lassitude and inability to plan. However, it has not been established that cannabis use is a cause of—or even that it preceded—the conditions described, nor has it been established that these conditions are found more frequently among cannabis users than in the population strata to which the users belong—usually the lower socio-economic classes in these countries.

Possible Effects on Maturation

Cannabis affects memory and attention as well as self-perception and the capacity to perceive reality. Alertness and awareness are modified. But, in truth, these acute effects last for several hours, at most, as our experiments have shown. However, it would seem that a severe anxiety state, even when temporary, and changes in perception of one's self and others, could have a greater effect on adolescents than more mature persons. This is because adolescents are passing through an identity crisis, due to their age and other social factors, which drug-related confusion may complicate. But there is no indication that any such cannabis-related difficulties would have permanent or irreversible effects.

We have very few facts to support a hypothesis of inadequate maturation which could be linked to a premature use of cannabis.

Cannabis and Criminality

For 75 years, the principal government-sponsored studies on cannabis use^[d] have concluded that there is no causal relationship between cannabis use and criminality. It is also evident that cannabis does not increase aggressivity. By far the greatest crime-inducing drugs are alcohol and, in certain respects, the amphetamines and, for very different reasons, heroin.

However, the law itself, consisting of prohibition with severe penal sanctions, engenders a certain kind of criminality. In fact, cannabis is in such great demand that many young Canadians have discovered they can easily earn large amounts of money selling it. This illicit trade has all the earmarks of a 'black market': buyers are occasionally cheated, lies must be told to explain large sums of money, etc. In any case, the 'black marketing' of cannabis certainly contributes nothing to the communication between adults and young people. The seller also often offers other drugs besides cannabis to his clientele.

Progression and Multi-Drug Use

It appears that cannabis does not *lead* to the use of other drugs, but it is true, as our surveys reveal, that a certain proportion of cannabis users take other drugs.

We are not dealing with a phenomenon that is limited to cannabis, LSD and the amphetamines (which are used in combination by only a few), but with an almost indiscriminate use of mood-changing substances in our society. *When we include alcohol, it can be said that Canadians consume great quantities of a variety of psychoactive drugs, even if cannabis is excluded.* A connection between cannabis and the use of other illicit drugs may be at least partially a function of the illegal status of cannabis which necessitates regular user involvement in illicit distribution networks which are often the sources for these other drugs.

Should cannabis be singled out for blame? Is it true that it constitutes the *first* step in the progression? Does it necessarily mark the beginning? Is it a necessary or sufficient link? While it is true that a certain proportion of cannabis users try LSD and a smaller proportion of users may eventually use amphetamines (drugs which present serious risks), it is not possible to say that cannabis use contributes to this phenomenon.

ARGUMENTS AGAINST LEGALIZATION

The number of users will double. This statement is probably reasonable. A large number of people replying to our questionnaires admit that they would use cannabis if it were legal. There is no doubt that legalization would be quickly followed by a large increase in the number of users, but can we assert that this growth would continue? Some would try cannabis and return to alcohol and tobacco. Others would take it, as is largely the practice now, when it is at hand—that is, only when the occasion arises.

Another drug is hardly needed; there are too many already. To this I reply

that the use of cannabis is already established; legalization will not introduce it to us.

The use of psychotropic drugs should be discouraged. Imprudent or excessive use of most drugs entails grave consequences to the individual, to the family, to society. *We cannot eliminate the use of psychotropic drugs in Canada.* We should therefore use the weapon of education as fully as possible rather than the penal code. It seems much wiser to base our hopes and efforts on a program of objective information for young and old and on the appropriate education to create the desire for moderation and self-control. Legalization would facilitate education—and personal and social control.

Persons dependent on hashish would not be satisfied with marijuana and would continue to support a significant illicit market. Hashish is more prevalent than marijuana in many areas of Canada only because it is a more convenient product to distribute illegally. We have no evidence that a significant proportion of cannabis users have developed a firm commitment to hashish, as opposed to a reasonably potent form of marijuana.

Importation of foreign supplies would be necessary. Recent botanical research in Ottawa indicates that potent marijuana can be grown in Canada. Although additional agricultural research would be required for efficient large-scale production, it is clear that no importation would be necessary to meet Canadian demand.

The production of a standardized product would be impossible. While there are still some significant questions to be resolved regarding optimal storage conditions for various cannabis preparations, there is growing evidence that the issue of shelf-life (cannabinoid degradation with time) need not be a major problem with natural marijuana. A product with a moderate, uniform level of Δ^9 THC could be reliably produced by blending marijuana from a high THC strain with low potency material—either marijuana or a semi-synthetic cellulose material, as has been developed for tobacco cigarettes. Alternatively, a stable form of pure THC might be impregnated on an inactive carrier material. The production of a standard hashish preparation would present greater practical difficulties than marijuana, but should not be ruled out.

CONCLUSIONS

With legalization, there is a strong possibility that the number of regular users will increase and that the effects of cannabis intoxication will be observed in a greater number of people. It is also expected that a certain number of cannabis users would go on to other hallucinogens and would make greater use of barbiturates, tranquilizers and alcohol, as well.

The probable consequences of legalization seem to me to be less harmful than the evils of prohibition. Prohibition is very expensive economically, socially and morally. It undermines the educative value of the law. The majority of my colleagues, though they would remove the prohibition against simple possession, do not take into account that the necessity of dealing in an illegal market will foster criminality among users.

A moratorium, which would serve only to postpone the decision which cannabis presses on this country, would not be in keeping with the information which we have taken so much trouble and time to accumulate.

I believe that it is not acceptable to claim that it is enough to “decriminalize” cannabis use. An important economic activity is developing in this country and would continue to develop without controls on price, on quality or on the involvement of organized crime (“decriminalization” of cannabis use alone would inevitably expand the illicit market and encourage this involvement). Cannabis users would continue to be supplied by distributors who will doubtless sell more dangerous products at the same time. Users would have to learn to deal with this situation with no assistance from society or its laws.

RECOMMENDATIONS

The federal government should remove cannabis from the *Narcotic Control Act*, as the Commission recommended in its *Interim Report*.

The federal government should immediately initiate discussions with the provincial governments to have the sale and use of cannabis placed under controls similar to those governing the sale and use of alcohol, including legal prohibition of unauthorized distribution and analogous age restrictions. Furthermore, this government-distributed cannabis should be marketed at a quality and price that would make the ‘black market’ sale of the drug an impractical enterprise.

The federal government should initiate a program to develop efficient practical methods for cannabis production and marketing in Canada. A standard form of natural marijuana would seem to be most feasible at this stage, but hashish and synthetic preparations should also be explored.

The federal government should initiate prospective multi-disciplinary epidemiological research to monitor and evaluate changes in the extent and patterns of the use of cannabis and other drugs, and to explore possible consequences to health, and personal and social behaviour, resulting from the controlled legal distribution of cannabis.

All stages of the production and marketing of cannabis should be conducted by the federal and/or provincial governments.

CONCLUSIONS AND RECOMMENDATIONS

of

Ian L. Campbell

I am in almost full agreement with my colleagues’ conclusions about the effects of cannabis, its relative potential for harm, the extent of its use, and the social costs and inappropriateness of the present law. I agree with them about the importance of finding means to discourage its use and in their special concern about use by adolescents. I also accept their cost-benefit approach to the problem and their concern to find sound jurisprudential

foundations for social policy. However, *I must dissent from their recommendation that the prohibition of the simple possession of cannabis be repealed and from part of the recommendation concerning cultivation. I am in full agreement with all of their other recommendations.*

A principal reason for my dissent is a fear that a repeal of the prohibition of simple possession, at this time, would be apt to be seriously misinterpreted, particularly by young people. The risks of such a misinterpretation, and the consequences which could follow from it, seem to me to outweigh the obvious advantages of repeal. Unfortunately, a repeal of the prohibition could too easily be taken as reflecting a judgement that cannabis is indeed safe. It is not realistic to expect that the balanced discussion of the drug's effects and potential for harm in this report will be read in detail by many potential users. The press is not likely to report in full our statements about the known and potential dangers of cannabis. Those of our cautionary statements that are reported and read are very apt to be glossed over and quickly forgotten. If the prohibition on the possession of cannabis were repealed they would be forgotten all the more quickly, and an environment would be created in which the cautionary statements of others might not be taken as seriously as prudent judgement would warrant. There are a number of reasons why a repeal of the prohibition would be prone to serious misinterpretation at the present time. One of the more important is the fact that so much of the debate about the legal status of cannabis has been built on the assertion that the drug is safe and should therefore be legalized and the counter assertion that it is highly dangerous and must be prohibited, or the argument that prohibition must be maintained until science has proved the drug safe. The frequent development of the argument in these simplistic terms has created a context in which repeal of the prohibition would be particularly prone to be accepted as an endorsement of the safety of cannabis. Moreover, the attitudes of many young people to adult authority are such that many will leap to the conclusion that the prohibition would have been maintained had there been any substantial evidence that the drug was dangerous or had a real potential for harm. As well, it seems inevitable that the action of repealing the prohibition would be used as propaganda with which to encourage the use of marijuana and hashish.

I think there is also a risk that the repeal of the prohibition on the possession of cannabis, even by the young, would be misunderstood as indicating a willingness by the society to condone and accept the use of the drug. There is little evidence to suggest that such a willingness exists.

Whether or not the reasons for repeal were misunderstood or misinterpreted, I am certain that repeal would be followed by a marked increase in the numbers who would use cannabis. It is, of course, impossible to estimate with any precision the numbers of new users that would result. However, available evidence makes it not unreasonable to think that there are more than half a million Canadians who have not used cannabis who would if possession were legal. No doubt, many of these potential users will, in time, come to use the drug whether or not the prohibition is lifted. In all probability, the vast majority of them will come to no harm as a result. Indeed, I am sure that the vast majority will never pass beyond experimental or occasional use. But a

minority will inevitably become regular users. Some of these will have their appetites whetted for the hallucinogenic experience and will move on to try LSD and other strong hallucinogens. The risk of such progression is probably not as great among those who have been deterred from use by the present law as among those who have already used cannabis. But the risk of progression is nonetheless real for some considerable number. Moreover, cannabis is generally perceived as a 'drug' in a way that alcohol is not. It is still too often linked with drugs such as LSD. A marked change in social policy removing a strong pressure against the use of marijuana and hashish would be apt to alter the general context of 'drug' taking in a fashion that could well facilitate the acceptance of other drugs.

The repeal of the prohibition of simple possession would also probably have the effect of increasing the frequency of use of many of those who have already used cannabis. In some cases this would occur because repeal would be incorrectly taken as an endorsement of the drug's safety and the acceptance of its use, in other cases because a moral and legal pressure against use had been removed.

It is clear that the existing laws have failed to deter more than a million Canadians from cannabis use. This failure has all the marks of becoming as great as the failure of the prohibition of the use of alcohol. But it is also clear that the law continues to have a deterrent capacity for many. I am sure that relatively little of that deterrent power comes, today, from the sanctions that can be applied against offenders. Rather, it comes from the fact that there are very large numbers who continue to respect the law. The law continues to have a moral power to command obedience. In part, this no doubt comes from a recognition of an obedience properly owed by the citizen. In part it also springs from a perception of the law as the embodiment of a conventional wisdom that one is prudent to heed. I am not persuaded that the time has yet come to remove the deterrent to cannabis use that the law prohibiting simple possession provides.

It can, of course, be argued that the prohibition of the possession of cannabis is so clearly an improper use of the criminal law power of the state that it should be repealed notwithstanding the probable consequences.

It seems to me to be an unassailable proposition that the majority may properly prohibit through the law conduct that is manifestly offensive or disturbing to them whether or not that conduct inflicts an injury on any particular person beyond the actor. This principle is recognized in our laws against public nudity. There is every reason to think that the public use of cannabis is offensive and disturbing to the vast majority of Canadians. There is even more reason to think that public use by young people is particularly offensive. Hence, it appears not inappropriate that such behaviour should be forbidden by law. There are, of course, areas where it has been accepted that behaviour must not be forbidden even though it is widely offensive—even to the vast majority. Such is the case with the expression of political, religious, or philosophical opinion and to a large extent the case with artistic expression. But these exceptions are made largely because to deny a right to such utterances is held to deny a right to use fundamental human vitality and potential that can find no other outlet and that a man denied this freedom is

less than a whole man. We do not hold that a denial of a right to public nudity or to public sexual activity is thus fundamentally limiting. I would find it ludicrous to argue that the denial of right to public cannabis use is a denial of any basic human freedom or the suppression of any valuable potential.

But what of private use? Is the use of cannabis to be condoned along with private homosexuality among consenting adults? Here a prohibition must rest upon a perception of serious risk of harm to the individual and an acknowledgement of a right to prohibit the citizen from exposing himself to such risks, or a perception of a serious risk to others or to the continued vitality of the society. I see the use of cannabis as presenting clear and potent dangers both to the individual and to our society. There is evidence enough to suggest a growing liking by young people for the intoxicated state whether the intoxicant be alcohol or cannabis. To whatever extent youthful experience of intoxication predisposes to chronic adult intoxication or acts to limit the full and healthy development of human potential it lessens the capacity of the individual for a full, rich and creative life and lessens his potential contribution to his society. The use of cannabis by young people is already widespread enough to give rise to real concern. It has already done real harm to many young lives. Consequently, I feel that the deterrence to use provided by a legal prohibition on possession ought to be maintained.

The potential for harm from adult use of cannabis is probably very much less than from use by the young. But, I find sufficient reasons to recommend the continuation of the general prohibition. Not the least of these reasons is the practical impossibility, at this time, of using the law to convey a perception of the dangers of cannabis without maintaining the prohibition for all, whether young or old.

The position of John Stuart Mill has frequently been put to us as a philosophical basis for removing the prohibition on the possession of cannabis. It has been urged that the law should not be used to prevent the individual from exposing himself to dangers that threaten him alone, and, that if as a result of intoxication he comes to injure another he ought to be punished for that injury. However, even if I were to fully accept the Mill position, I would, at this time, recommend that the prohibition be continued. The use of cannabis by young people has caused and continues to cause very real injury to the lives of tens of thousands of parents and others in the families and circles of friends of users. There can be no doubt of the magnitude of the injury to these people as individuals and to whole families. Many young cannabis users have shown an almost callous lack of concern for such consequences of their behaviour—a callousness that does not accord well with their preachments about love and concern and respect for others. Moreover, Mill recognized that limitations might properly be applied to the freedom of the young, that should not, in his view, be applied to adults. Further, the absence of a practical means of determining the presence of cannabis in the body makes it difficult or impossible to determine the fact of intoxication in cases where intoxication would contribute to the infliction of an injury to another.

In appearing before us, young people have frequently insisted that their right to make decisions that affect only themselves is in all respects equal to

that of adults. I have already rejected the opinion that cannabis use by young people affects only them. However, the assertion that their rights are identical to those of adults must be answered. There are rights, such as a basic right to life, that seem to me to be properly attached to an individual at the moment of conception. But most rights become properly attached to an individual only as he matures in his capacity to exercise them with a tolerable level of wisdom, as he develops an ability to perceive a corresponding repertoire of responsibilities to himself and to others, and as he gains an ability to recognize and wisely weigh the consequences of his behaviour. We have properly been concerned about the damage done by placing too many duties and responsibilities on the individual too early. But it seems to me that recently we have been far too little concerned with the consequences of placing too many rights and freedoms on the shoulders of the young.

It was frequently put to us that the maintenance of the prohibition on the possession of cannabis would contribute to a further alienation of young people in Canada and would foster an increased disrespect for the law in general. There is no doubt that the law with respect to cannabis and the manner of its enforcement has contributed to the alienation of a certain number of young people. It has been perceived, by them, as stupid and hypocritical legislation applied in a discriminatory manner. The very heavy and clearly inappropriate penalties imposed on some users and the obviously selective nature of enforcement have probably contributed as much or more to this reaction than the fact of prohibition per se. I can see relatively little danger of producing profound alienation if we apply a reasonable law, with reasonable sanctions that both reflects the drug's actual potential for harm and the dominant attitudes and concerns in the society.

Many young people have argued before us that as their parents have chosen alcohol as an intoxicant they have chosen cannabis—that we are an alcohol and they the marijuana generation. To some considerable extent this is true. They have further asserted that it is crass hypocrisy for us to maintain the prohibition on cannabis while enjoying liquor. Although an over-simplification, this argument has a moral and logical appeal. But, there are few who would argue that widespread alcohol use should not be strongly discouraged and indeed prohibited among young people. The fact that large numbers of adults continue to behave with stupidity in their use of alcohol, and, for that matter, tobacco, is not a sound argument for the removal of the prohibition against cannabis even if some measure of hypocrisy is involved. While those of us who use alcohol but favour a prohibition of cannabis may display hypocrisy, I would hold that we are primarily showing a concern for the young and a fear of the consequences of their further use of cannabis. When we urge the young to “do as we say not as we do”, we may be admitting to our own lack of wisdom in the use of intoxicants.

It cannot be denied that the maintenance of the prohibition will have unfortunate direct and indirect social costs. On balance, however, I believe that the costs of a repeal of the prohibition somewhat outweigh the high, and at the personal level, often tragic, costs of its continuation. I feel I must draw attention to one of the indirect costs that would follow from an implementation of my colleagues' recommendation. The honest reactions of most parents

to the prospect of marijuana or hashish use by their children vary from worry and disappointment to anguish and terror. Any action that might increase the probability of cannabis use by their children will place a heavy burden of anxiety on them. I suspect that that burden would be greater than that which has been carried by the thousands of parents who, for some years now, have been forced to live almost daily with the possibility of their children's arrest on a charge of cannabis possession.

I am also concerned by the fact that the majority recommendation would place less legal restriction on the use of cannabis by young people than at present exists on the use of alcohol by children. The illicit use of alcohol by minors is already at alarming levels. But cannabis, as an intoxicant, has some dangers that are greater than those posed by alcohol. It is obvious that it is far easier to smoke a 'joint' than to drink a bottle of beer on the way to school or at recess. A dozen marijuana cigarettes are no more obvious in the pocket than twelve home-made cigarettes—neither make the bulge of a 'mickey' of rye. A cube of hashish is far easier for a child to hide in his room than a case of beer or a bottle of liquor. Neither marijuana nor hashish leave a tell-tale odour on the breath. The intoxicated cannabis user is far less obvious than the drunk. It is also clear that cannabis use can be far less visible than drinking in the executive office, on the construction site, or in the car or cockpit.

I am also concerned by a number of consequences of fostering a legal demand and use of cannabis that can only be met by an illegal supply system. It seems to me to be as morally repugnant to punish the cannabis trafficker but not his customer as to stigmatize and punish the prostitute and not her customer. Moreover, enhancing the demand for a commodity that can only be supplied illegally will certainly increase the probability that organized crime will seek to control the cannabis market. This will inevitably increase the revenues of organized crime and at the same time increase the already real risks of police and political corruption in connection with cannabis distribution. Although it may weaken the totality of my position I must point out that the revenue of organized crime during the prohibition of alcohol provided the capital that made possible the type of organized crime that exists today.

In consequence of these and other considerations, **I must dissent from the recommendation of the majority of my colleagues and recommend that the prohibition on the possession of cannabis be maintained, for the time being at least. Possession of cannabis should be punishable, upon summary conviction, by a fine of \$25.00 for the first offence and by a fine of \$100.00 for any subsequent offence.** I fully realize that these penalties will not be a potent deterrent to those who will not be deterred by the purely moral force of the law. But far heavier potential penalties have clearly failed to deter. I believe that the reduction of penalties to this level will on the one hand maintain most of the existing deterrent capacity of the law and on the other help to reduce the stigmatization of those convicted to appropriate levels—levels similar to those for under-age drinking or buying alcohol from a bootlegger.

With respect to the cultivation of cannabis other than for purposes of trafficking, I recommend that it continue to be an offence with penalties identical to those which I recommend for simple possession.

No doubt there is substance to the contention of the R.C.M. Police and others that the possessional offence is a potent weapon with which to combat trafficking. It is entirely reasonable to assume that a high proportion of those currently arrested for possession as a result of systematic police investigation are in fact guilty of trafficking. I realize that the penalties I propose for those found guilty of possession will be of negligible value in combatting the distribution of marijuana or hashish. Unfortunately, the possessional offence could have utility in coping with this problem only if very severe sanctions, including long imprisonment, could be imposed. Such penalties are clearly inappropriate to the offence of simple possession of cannabis. It is impossible to believe that they could be sufficiently useful in combatting trafficking to offset the obvious dangers in maintaining them in the law.

NOTES

- [a] Our surveys show that of all the people who had ever used cannabis by 1970, approximately 23 per cent had used LSD. For the high school population, the figure was approximately 35 per cent. Over 95 per cent of those who had used LSD had also used cannabis.
- [b] *Criminal Records Act*, Revised Statutes of Canada, 1970, Chap. 12 (1st Supp.). Under this Act a person may apply to the federal government for a pardon when two years have elapsed following satisfaction of the sentence in summary conviction cases and five years in other cases. The pardon is granted upon recommendation of the National Parole Board. The effect of such pardon is to vacate the conviction, remove any disqualifications resulting from it under federal legislation or regulations, and prevent any question from being asked concerning the conviction in connection with service in the armed forces or employment in government or any enterprise under federal jurisdiction. Thereafter the record of the conviction may be disclosed only for certain limited purposes with the authorization of the Solicitor General.
- [c] In Belgium, the Netherlands, Denmark, Norway and Sweden, the maximum penalty for trafficking in cannabis ranges from two to six years' imprisonment; in Great Britain, it is twelve months on summary conviction and fourteen years upon indictment; in France, it is ten years, although certain acts which would be included in the definition of trafficking are punishable by as much as twenty years; in the United States, under the federal law (the *Comprehensive Drug Abuse Prevention and Control Act* of 1970), the maximum penalty for a first offence of trafficking in cannabis is five years plus a special parole term of at least two years, and for a subsequent offence, ten years plus a special parole term of at least four years. In the case of distribution by a person of at least 18 years of age to a person under 21 years of age, the maximum penalty is double what it is in an ordinary first offence and triple what it is in an ordinary subsequent offence. Thus, in certain cases, the maximum penalty for trafficking in cannabis under federal law can be as high as thirty years. The maximum penalties under state law are, in many cases, much higher than they are under federal law.
- [d] Major reports include the British *Indian Hemp Drugs Commission Report* (1893-4); Mayor La Guardia's report on *The Marihuana Problem in the City of New York* (1944); the *Proceedings* of the White House Conference on Narcotic and Drug Abuse (1962); the United States President's Commission on Law Enforcement and Administration of Justice *Task Force Report: Narcotics and Drug Abuse* (1967); the United States Department of Health, Education and Welfare report *Marihuana and Health* (1971). Other government reports of significance appear in the bibliography to Chapter 2.

Appendices

APPENDIX A

Convictions and Sentences Involving Cannabis in 1970 and 1971

The tables appearing in this appendix provide data on convictions and sentences under the *Narcotic Control Act* with respect to cannabis, for the years 1970 and 1971. The tables were presented to the Commission by the Bureau of Dangerous Drugs [formerly the Narcotic Control Division] of the Department of National Health and Welfare.

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TABLE A.1
CONVICTIONS INVOLVING CANNABIS DURING 1970

Province	Possession	Trafficking	Possession for Purpose of Trafficking			Total
	Section 3(1)	Section 4(1)	Section 4(2)	Importing	Cultivating	
Newfoundland	20	3	1	—	—	24
Prince Edward Island	9	—	—	—	—	9
Nova Scotia	88	12	9	—	—	109
New Brunswick	64	12	9	—	—	85
Quebec	881	26	71	23	—	1,001
Ontario	2,222	58	140	2	4	2,426
Manitoba	133	41	11	—	4	189
Saskatchewan	276	22	13	—	6	317
Alberta	442	91	34	1	—	568
British Columbia	1,257	179	66	—	29	1,509
Yukon	27	4	2	—	—	33
Total	5,399	446	356	26	43	6,270

TABLE A.2
CONVICTIONS INVOLVING CANNABIS DURING 1971

Province	Possession	Trafficking	Possession for Purpose of Trafficking			Cultivating	Total
	Section 3(1)	Section 4(1)	Section 4(2)	Importing	Section 6(1)		
Newfoundland	81	11	8	—	—	100	
Prince Edward Island	19	4	—	—	—	23	
Nova Scotia	181	6	10	1	—	198	
New Brunswick	105	8	14	—	—	127	
Quebec	1,208	20	86	14	13	1,341	
Ontario	3,673	129	229	2	13	4,046	
Manitoba	224	71	26	3	—	324	
Saskatchewan	367	24	26	—	1	418	
Alberta	613	42	36	1	3	695	
British Columbia	1,882	159	95	1	28	2,165	
Yukon & Northwest Territories	36	2	3	—	—	41	
Total	8,389	476	533	22	58	9,478	

TABLE A.3
SENTENCES AWARDED IN CASES INVOLVING POSSESSION OF CANNABIS DURING 1970

Age group	Fine only	Probation or S/S	Indefinite period	Under 6 mos.	6 mos. to less than 1 yr.	1 yr. to less than 2 yrs.	2 yrs. to less than 3 yrs.	3 yrs. to less than 4 yrs.	4 yrs. to less than 5 yrs.	5 yrs. to less than 6 yrs.	6 yrs. to less than 7 yrs.	7 yrs. to less than 8 yrs.	8 yrs. to less than 9 yrs.	9 yrs. to less than 10 yrs.	10 yrs. and over	Total
Under 18	306	350	8	23	2	1	—	1	—	—	—	—	—	—	—	691
18 — 20	1,472	499	3	194	20	11	1	—	—	—	—	—	—	—	—	2,203
21 — 24	1,373	248	—	145	25	7	3	1	—	—	—	—	—	—	—	1,806
25 — 29	396	47	—	55	12	4	—	—	—	—	—	—	1	—	—	516
30 — 34	86	12	—	15	1	2	—	—	—	—	—	—	—	—	—	116
35 — 39	28	5	—	2	2	—	2	—	—	—	—	—	—	—	—	41
40 — 49	16	6	—	1	1	—	—	—	—	—	—	—	—	—	—	24
50 — 59	6	—	—	—	—	—	1	—	—	—	—	—	—	—	—	7
Not Known	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
Total	3,688	1,167	11	435	63	25	7	2	—	—	—	—	1	—	—	5,409

TABLE A.4
SENTENCES AWARDED IN CASES INVOLVING POSSESSION OF CANNABIS DURING 1971

Age group	Fine only	Probation or S/S	Indefinite period	Under 6 mos.	6 mos. to less than 1 yr.	1 yr. to less than 2 yrs.	2 yrs. to less than 3 yrs.	3 yrs. to less than 4 yrs.	4 yrs. to less than 5 yrs.	5 yrs. to less than 6 yrs.	6 yrs. to less than 7 yrs.	7 yrs. to less than 8 yrs.	8 yrs. to less than 9 yrs.	9 yrs. to less than 10 yrs.	10 yrs. and over	Total
Under 18	548	539	6	22	6	1	-	-	-	-	-	-	-	-	-	1,122
18 - 20	2,547	503	-	165	26	2	1	-	-	-	-	-	-	-	-	3,244
21 - 24	2,290	201	-	189	29	10	2	2	-	-	-	-	-	-	-	2,723
25 - 29	798	78	-	66	8	2	-	-	-	-	-	-	-	-	-	952
30 - 34	185	6	1	18	3	-	-	-	-	-	-	-	-	-	-	213
35 - 39	49	4	-	3	1	-	-	-	-	-	-	-	-	-	-	57
40 - 49	42	4	-	4	1	-	-	-	-	-	-	-	-	-	-	51
50 - 59	7	1	-	-	-	-	-	-	-	-	-	-	-	-	-	8
60 - 69	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3
Unknown	13	2	-	1	-	-	-	-	-	-	-	-	-	-	-	16
Total	6,481	1,338	8	468	74	15	3	2	-	-	-	-	-	-	-	8,389

TABLE A.5
SENTENCES AWARDED IN CASES INVOLVING TRAFFICKING IN CANNABIS DURING 1970

Age group	Fine only	Probation or S/S	Indefinite period	Under 6 mos.	6 mos. to less than 1 yr.	1 yr. to less than 2 yrs.	2 yrs. to less than 3 yrs.	3 yrs. to less than 4 yrs.	4 yrs. to less than 5 yrs.	5 yrs. to less than 6 yrs.	6 yrs. to less than 7 yrs.	7 yrs. to less than 8 yrs.	8 yrs. to less than 9 yrs.	9 yrs. to less than 10 yrs.	10 yrs. and over	Total
Under 18	4	36	-	26	3	4	-	-	-	-	-	-	-	-	-	73
18-20	8	32	1	40	35	48	6	5	-	1	-	-	-	-	-	173
21-24	4	14	-	28	29	53	8	6	-	-	-	-	-	-	-	138
25-29	2	-	-	10	6	12	4	6	1	-	-	-	-	-	-	40
30-34	-	-	-	1	-	1	-	2	-	-	-	-	-	-	-	4
35-39	1	-	-	-	2	2	-	-	-	-	-	-	-	-	-	3
40-49	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	3
50-59	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Not Known	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Total	19	83	1	107	76	121	18	19	1	1	-	-	-	-	-	436

TABLE A.6
SENTENCES AWARDED IN CASES INVOLVING TRAFFICKING IN CANNABIS DURING 1971

Age group	Fine only	Probation or S/S	Indefinite period	Under 6 mos.	6 mos. to less than 1 yr.	1 yr. to less than 2 yrs.	2 yrs. to less than 3 yrs.	3 yrs. to less than 4 yrs.	4 yrs. to less than 5 yrs.	5 yrs. to less than 6 yrs.	6 yrs. to less than 7 yrs.	7 yrs. to less than 8 yrs.	8 yrs. to less than 9 yrs.	9 yrs. to less than 10 yrs.	10 yrs. and over	Total
Under 18	6	20	1	9	5	5	-	-	-	-	-	-	-	-	-	46
18-20	5	35	1	59	51	26	5	-	-	-	-	-	-	-	-	182
21-24	9	27	-	52	42	33	7	3	-	-	-	-	-	-	-	173
25-29	-	2	-	17	22	14	4	-	-	2	-	-	-	-	-	61
30-34	1	4	-	2	2	1	-	-	-	1	-	-	-	-	-	11
35-39	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
40-49	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	2
50-59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60-69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	21	89	2	139	123	79	16	4	-	3	-	-	-	-	-	476

TABLE A.7
SENTENCES AWARDED IN CASES INVOLVING POSSESSION FOR
PURPOSE OF TRAFFICKING IN CANNABIS DURING 1970

Age group	Fine only	Probation or S/S	Indefinite period	Under 6 mos.	6 mos. to less than 1 yr.	1 yr. to less than 2 yrs.	2 yrs. to less than 3 yrs.	3 yrs. to less than 4 yrs.	4 yrs. to less than 5 yrs.	5 yrs. to less than 6 yrs.	6 yrs. to less than 7 yrs.	7 yrs. to less than 8 yrs.	8 yrs. to less than 9 yrs.	9 yrs. to less than 10 yrs.	10 yrs. and over	Total
Under 18	6	25	1	6	2	1	-	1	-	-	-	-	-	-	-	42
18 - 20	11	22	-	46	23	18	5	-	1	1	-	-	-	-	-	127
21 - 24	7	6	-	45	43	27	2	4	1	-	-	-	-	-	-	135
25 - 29	4	-	-	7	11	10	6	4	-	-	-	-	-	-	-	42
30 - 34	1	-	-	-	2	1	-	1	-	-	-	-	-	-	-	5
35 - 39	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-	3
40 - 49	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	2
50 - 59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Not Known	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	29	53	1	104	84	59	13	10	2	1	-	-	-	-	-	356

TABLE A.8
SENTENCES AWARDED IN CASES INVOLVING POSSESSION FOR PURPOSE OF TRAFFICKING IN CANNABIS DURING 1971

Age group	Fine only	Probation or S/S	Indefinite period	Under 6 mos.	6 mos. to less than 1 yr.	1 yr. to less than 2 yrs.	2 yrs. to less than 3 yrs.	3 yrs. to less than 4 yrs.	4 yrs. to less than 5 yrs.	5 yrs. to less than 6 yrs.	6 yrs. to less than 7 yrs.	7 yrs. to less than 8 yrs.	8 yrs. to less than 9 yrs.	9 yrs. to less than 10 yrs.	10 yrs. and over	Total
Under 18	6	36	—	8	10	7	—	1	—	—	—	—	—	—	—	68
18 — 20	19	28	1	50	47	40	5	—	—	—	—	—	—	—	—	190
21 — 24	11	8	—	45	44	49	12	5	—	2	—	—	—	—	—	176
25 — 29	3	5	—	15	16	22	7	3	5	3	—	—	—	—	—	79
30 — 34	—	—	—	3	2	4	3	—	—	4	—	—	—	—	—	16
35 — 39	—	—	—	2	—	1	—	—	—	—	—	—	—	—	—	3
40 — 49	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50 — 59	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
60 — 69	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unknown	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
Total	39	77	1	124	119	123	27	9	5	9	—	—	—	—	—	533

TABLE A.9
SENTENCES AWARDED IN CASES INVOLVING THE IMPORTING OF CANNABIS DURING 1970

Age group	Fine only	Probation or S/S	Indefinite period	Under 6 mos.	6 mos. to less than 1 yr.	1 yr. to less than 2 yrs.	2 yrs. to less than 3 yrs.	3 yrs. to less than 4 yrs.	4 yrs. to less than 5 yrs.	5 yrs. to less than 6 yrs.	6 yrs. to less than 7 yrs.	7 yrs. to less than 8 yrs.	8 yrs. to less than 9 yrs.	9 yrs. to less than 10 yrs.	10 yrs. and over	Total
Under 18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18 - 20	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	4
21 - 24	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-	17
25 - 29	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	4
30 - 34	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
35 - 39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40 - 49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50 - 59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-	-	-	-	26	-	-	-	26

TABLE A.10
SENTENCES AWARDED IN CASES INVOLVING THE IMPORTING OF CANNABIS DURING 1971

Age group	Fine only	Probation or S/S	Indefinite period	Under 6 mos.	6 mos. to less than 1 yr.	1 yr. to less than 2 yrs.	2 yrs. to less than 3 yrs.	3 yrs. to less than 4 yrs.	4 yrs. to less than 5 yrs.	5 yrs. to less than 6 yrs.	6 yrs. to less than 7 yrs.	7 yrs. to less than 8 yrs.	8 yrs. to less than 9 yrs.	9 yrs. to less than 10 yrs.	10 yrs. and over	Total
Under 18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18 - 20	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
21 - 24	-	-	-	-	-	-	-	-	-	-	-	7	-	-	5	12
25 - 29	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	4
30 - 34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
35 - 39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40 - 49	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	3
50 - 59	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
60 - 69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-	-	-	-	-	16	-	-	6	22

TABLE A.11
SENTENCES AWARDED IN CASES INVOLVING CULTIVATION OF CANNABIS DURING 1970

Age group	Fine only	Probation or S/S	Indefinite period	Under 6 mos.	6 mos. to less than 1 yr.	1 yr. to less than 2 yrs.	2 yrs. to less than 3 yrs.	3 yrs. to less than 4 yrs.	4 yrs. to less than 5 yrs.	5 yrs. to less than 6 yrs.	6 yrs. to less than 7 yrs.	7 yrs. to less than 8 yrs.	8 yrs. to less than 9 yrs.	9 yrs. to less than 10 yrs.	10 yrs. and over	Total
Under 18	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3
18 - 20	2	8	-	1	-	1	-	-	-	-	-	-	-	-	-	12
21 - 24	6	6	-	2	2	1	-	-	-	-	-	-	-	-	-	17
25 - 29	2	-	-	3	-	-	1	-	-	-	-	-	-	-	-	6
30 - 34	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	3
35 - 39	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2
40 - 49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50 - 59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	10	17	-	11	2	2	1	-	-	-	-	-	-	-	-	43

TABLE A.12
SENTENCES AWARDED IN CASES INVOLVING CULTIVATION OF CANNABIS DURING 1971

Age group	Fine only	Probation or S/S period	Indefinite	Under 6 mos.	6 mos. to less than 1 yr.	1 yr. to less than 2 yrs.	2 yrs. to less than 3 yrs.	3 yrs. to less than 4 yrs.	4 yrs. to less than 5 yrs.	5 yrs. to less than 6 yrs.	6 yrs. to less than 7 yrs.	7 yrs. to less than 8 yrs.	8 yrs. to less than 9 yrs.	9 yrs. to less than 10 yrs.	10 yrs. and over	Total
Under 18	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	7
18 - 20	5	3	-	3	1	-	-	-	-	-	-	-	-	-	-	12
21 - 24	6	6	-	9	2	-	-	1	-	-	-	-	-	-	-	24
25 - 29	5	2	-	2	-	-	-	-	-	-	-	-	-	-	-	9
30 - 34	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	3
35 - 39	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
40 - 49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50 - 59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60 - 69	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2
Unknown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	18	17	-	19	3	-	-	1	-	-	-	-	-	-	-	58

APPENDIX B

Commissioners and Staff

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*These staff members are no longer with the Commission.

Contract researchers and consultants to the Commission will be listed in a subsequent report.

References and Selected Bibliographies

REFERENCES AND SELECTED BIBLIOGRAPHY

As noted in Chapter 1, the Commission has had access to several thousand papers and books dealing with cannabis. No attempt has been made to reference all available documents, either in the text or in the list presented here. This bibliography contains all documents directly referenced, as well as a selected list of other materials which have been most useful in preparing Chapter 2 and its annexes.

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Glossary

Glossary

Abstinence Syndrome. See *withdrawal syndrome* and *physical dependence*.

Acute. Of short duration and, usually, of relatively high intensity.

Addiction (drug). An ambiguous term with various meanings in different situations. The concept usually implies a strong *psychological dependence* or compulsion to use and/or *physical dependence* (*withdrawal symptoms* in abstinence) and, often, *tolerance* and a tendency to increase dose. Many feel that the term has little general scientific value and should be replaced with more specific concepts.

Additive Drug Effect. A response to a combination of drugs which is of greater magnitude than the effect of each drug alone. Various types of positive interaction effects are often further distinguished in the pharmacological literature.

Administration (drug). The process of introducing a drug into the body (e.g., swallowing, inhaling or injecting).

Adverse Reaction (drug). A drug reaction which is considered unpleasant or harmful psychologically and/or physiologically.

After-image (visual). Visual sense impressions remaining after specific external stimulation of the eye has ceased.

Alienation. A sense of estrangement from society, usually characterized by feelings of powerlessness and meaninglessness.

Amotivational Syndrome. A set of symptoms including apathy, ineffectiveness, and non-productiveness, considered to reflect a deficit in general motivation. It has been suggested that such a *syndrome* may result from the chronic use of certain drugs.

Amphetamines. A group of synthetic *stimulant* drugs which are commonly used to increase alertness and activity (as 'pep pills') to reduce appetite (as 'diet pills') and to produce a state of *euphoria*. Benzedrine®, Dexedrine® and Methedrine® are examples. (Compare *speed*.)

Anaesthesia. The loss of feeling or sensation, and may imply (with general anaesthetics) a loss of consciousness.

Analgesic. Pain relieving.

Antagonist (drug). A drug which blocks or counteracts certain effects of another drug.

Aphrodisiac. Sex-drive stimulating.

Ataxia. Impaired co-ordination of movement.

Attention. The selective focussing of awareness on certain aspects of the environment.

Autokinetic Effect. The apparent movement of a small stationary point of light viewed in the dark. The perceived movement is often a slow drift with occasional and irregular changes in direction.

Autonomic Nervous System. A division of the nervous system concerned with the regulation of smooth muscles and glands, and generally not subject to voluntary control.

Average. A measure which describes what is typical of a group with respect to some trait, characteristic, or variable. It is often used as synonymous with the *mean*. (Compare *mean*, *median*, *mode*.)

Barbiturates. A group of *sedative* drugs derived from barbituric acid, commonly used to reduce tension, facilitate sleep, or as an anaesthetic, or anti-convulsant.

Behavioural Dependence. See *psychological dependence*.

Bhang. A term used in India for *marijuana*. It may be smoked or taken as a drink.

Biotransformation. See *metabolism*.

Blood Alcohol Level (b.a.l.). The concentration of alcohol in the blood (usually represented in per cent by weight).

Blood Pressure. The pressure of the blood in the arteries, dependent on the action of the heart and the resistance of the blood vessels. Blood pressure is called "diastolic" when the ventricles of the heart are relaxed and "systolic" when the ventricles are contracted.

Breathalyzer. An instrument which gives an estimate of the *blood alcohol level* by measuring the amount of alcohol in the air exhaled from the lungs.

Cannabidiol (CBD). One of the major *cannabinoids* generally present in *cannabis*. CBD has little direct acute effect.

Cannabinoid. A class of Carbon 21 compounds typical of, or present in, *Cannabis sativa*, including a number of carboxylic acids, analogues and transformation products. Similar synthetic compounds are also termed cannabinoids. *THC*, *CBD*, and *CBN* are the three major groups of cannabinoids.

Cannabinol (CBN). One of the major *cannabinoids* often present in *cannabis*. CBN has little direct acute effect. The term has also often been used to refer to the *cannabinoids* collectively, but this latter usage is becoming uncommon.

Cannabis. A general term for various preparations of *Cannabis sativa* and *cannabinoids*. *Marijuana*, *hashish*, and *THC* are examples of different forms of cannabis.

***Cannabis sativa* L.** An herbaceous annual plant which readily grows untended in temperate climates. Also called hemp. The plant is valued for its fibre and for its psychotropic qualities.

Carcinogenic. Cancer producing.

Cardiovascular. Pertaining to the heart and blood vessels.

CBD. See *cannabidiol*.

CBN. See *cannabinol*.

Central Nervous System (CNS). That portion of the nervous system consisting of the brain and spinal cord.

Charas. A term used in India for *hashish* (cannabis resin).

Choice Reaction Time. *Reaction time* in a task which requires the subject to make a different response to different stimuli presented.

Chromosomes. Thread-like materials in the nucleus of a cell which contain the genes (the factors responsible for transmission of inherited characteristics).

Chronic. Persisting over a long period of time.

Clyde Mood Scale (CMS). A test which can be used to measure changes in human emotions and behaviour produced by drugs. The subject is rated by himself or by others on 48 descriptive adjectives. Six independent factor scores are calculated from these ratings.

CNS. See *central nervous system*.

Cognition. The intellectual faculty of knowing, thinking, perceiving and reasoning, as opposed to emotion and will.

Compensatory Tracking. A *psychomotor tracking* test in which the subject is presented with a moving stimulus and a fixed target which represents the desired output. The objective is to compensate for the movement of the stimulus causing it to coincide with the target.

Conjunctival Congestion (or Injection). Reddening of the eye due to enlargement of the minor blood vessels around the outer surface of the eye—commonly known as ‘blood-shot eyes’. This is a common effect of cannabis and alcohol.

Contact High. A subjective condition in which persons familiar with the effects of a drug, experience some of these effects without taking the drug, when interacting with persons who are ‘high’.

Control Group. A group of subjects similar to the *experimental group* (and exposed to all the conditions of the investigation) except for the experimental or selection variable being studied. The use of an appropriate control group enables the investigator to better isolate the effects of the experimental variable, by controlling (or correcting) for the influence of certain extraneous factors.

Correlation. The interrelationship or co-variation of two or more variables so that an increase in the magnitude of one is associated with an increase (positive correlation) or decrease (negative correlation) in the magnitude of the other. The relationship between measures taken from different individuals at a single point in time (between-subject correlation) is distinguished from the relationship between changes in different measures in an individual over time (within-subject correlation).

Criminogenic. Crime producing.

Cross-dependence. A condition in which the administration of one drug can prevent the *withdrawal symptoms* associated with *physical dependence* on a different drug.

Cross-tolerance. A condition in which *tolerance* developed to the administration of one drug also results in a lessened response to a different drug.

Dark Adaptation. The adjustment of the eye to a reduction in light intensity, resulting in a gradual increase in the ability to see faintly illuminated objects.

Delirium. A condition (usually of relatively short duration) characterized by excitement, confusion, incoherence, *illusions*, *delusions* and, sometimes, *hallucinations*.

Delusion. A belief which exists in spite of contrary reason or evidence which would normally be considered sufficient to change it.

Dementia. A deterioration in intellectual ability and in appropriateness of emotional response.

Dependence (drug). A state of *psychological* and/or *physical dependence* on a drug following periodic or continued use of the drug. Specific characteristics of dependence usually vary with different drugs and different patterns of use.

Depersonalization. A state in which a person's sense of the 'reality' or existence of his mind or body is weakened or lost.

Depressant. A drug which depresses or decreases activity and arousal. Depressants may be classified according to the organ or physiological system upon which they act. The terms *central nervous system* depressant and *sedative* are often used interchangeably.

Digit Symbol Substitution Test (DSST). A test of learning and *psychomotor* performance in which geometric symbols are equated with numerical digits. Subjects are given the code and must copy, as quickly as possible, the appropriate symbol under each digit presented in an irregularly ordered list.

Dose (or Dosage). The amount or quantity of drug administered.

Dose-Response Relationship. The relationship between the quantity of a drug administered (*dose*) and the intensity of the response it elicits. (Compare *time-response*.)

Double Blind. An experimental procedure in which neither the subject nor the researcher knows which particular treatment (e.g., the identity or dose of a drug or a *placebo*) is being given at the time of the study. This procedure may reduce the influence of the *set* and *setting*, *placebo* effects, and other kinds of subject and scientist bias. (Compare *single blind*, *placebo*.)

Driving Simulator. A laboratory apparatus for the measurement of behaviour presumed to be involved in automobile driving performance.

Drug. Any substance that, by its chemical nature, alters structure or function in the living organism. Substances which are typically required for the maintenance of normal function (such as foods) are generally excluded from this definition.

Electroencephalogram (EEG). The graphic record of wavelike changes in electrical potential (voltage) obtained when electrodes are placed on the scalp or on (or in) the exposed brain. These 'brain waves' are considered to reflect some aspects of neurological function.

Epidemiology. The study of the occurrence, distribution or other characteristics of a condition or phenomenon in a *population*.

Euphoria. An exaggerated sense of well being and happiness.

Experimental Group. Those subjects which are exposed to the experimental (or treatment) variable (e.g., a drug) and whose behaviour or condition is considered to reflect the influence, if any, of that variable. This influence may be revealed by comparing the experimental subjects with a matched control group.

Fate (physiological). The process(es) by which a drug is metabolized and/or excreted from the body.

Flashback. The 'spontaneous' recurrence of some aspect of a drug's subjective effects in the absence of the drug. Flashbacks may vary considerably in quality and intensity.

Ganja. A term used in India for the flowering tops of *Cannabis sativa* selected for their high *psychotropic* potential. In Jamaica, the term is used more generally to refer to any form of *marijuana*.

Gastrointestinal. Pertaining to the stomach and intestines.

Glare Recovery Time. The time required for visual perception to return to normal after short exposure to a bright light.

Habituation (drug). Usually implies continued drug use (and perhaps *psychological dependence*) but little or no *tolerance* or *physical dependence*. In other words, the use of the drug has become a habit. This term is no longer commonly used in the scientific literature.

Hallucination. A sensory *perception* which is not based on an external physical stimulus. Pseudo- and true hallucinations are often distinguished: A true hallucination includes the belief that the abnormal perception is physically real, while a pseudo-hallucination is recognized as being 'unreal' or a distortion of normal perception (compare *illusion*). By this scheme, so-called hallucinogenic drugs usually produce pseudo-hallucinations rather than true hallucinations, although in acute psychotic drug reactions 'reality contact' may be lost.

Hallucinogen. A drug which readily produces *hallucinations*. (Compare *psychedelic-hallucinogenic drugs*.)

Hashish. A resin, usually several times more potent than *marijuana*, which is obtained from *Cannabis sativa* by shaking, pressing or scraping the leaves and flowers of the plant.

Hemp. *Cannabis sativa*.

Heroin. A semisynthetic derivative of morphine. More potent than morphine, heroin is generally the preferred drug among persons dependent upon illicit *opiate narcotics*.

High. The general subjective psychological or *phenomenological* effects of a drug.

Hypnotic. Sleep inducing.

Illusion. A false or misinterpreted sensory impression. The individual is usually aware of the 'unreal' qualities of the *perception*. (Compare *delusion*, *hallucination*.)

Ingestion. Taking food, drugs, etc., into the stomach by mouth.

Interview Schedule. A list of questions used to structure an interview, the answers to which are recorded by the interviewer rather than the respondent.

Intravenous Injection. The injection of a drug directly into a blood vein (usually with a hypodermic syringe).

Joint. A *marijuana* cigarette.

Latency. The period of inactivity between stimulation and the response or reaction to that stimulation.

Latin Square. A balanced classification scheme which can be incorporated in a variety of experimental research designs. Subjects are divided into a number of groups equal to the number of different treatment conditions to be investigated. Each group receives all treatment conditions once over the course of the experiment, but in a different sequential order, such that each treatment is given only once per serial position. For example, if three treatment conditions (A, B and C) were employed, they would be given to three subject groups in the following order: Group I-ABC; Group II-BCA; Group III-CAB.

Longitudinal Study. A study of individuals or phenomena at various points in time, designed to determine the developments, or changes in, the conditions under investigation.

LSD (*d*-lysergic acid diethylamide-25). A semisynthetic derivative of lysergic acid. LSD is one of the most potent *psychotropic* drugs known, and may be considered the prototype for the *psychedelic-hallucinogenic* drug class.

Marijuana. A mixture of crushed leaves, flowers, twigs and often seeds of the plant *Cannabis sativa*.

Mean. One of several measures commonly used to represent a typical or average observation in a set of observations. It is calculated by dividing the sum of all the scores by the number of scores. (Compare *average*, *median*, *mode*.)

Median. One of several measures commonly used to represent a typical observation in a set of observations. It is the value which is greater than half of the values and less than the other half (i.e., the mid-point). (Compare *average*, *mean*, *mode*.)

Metabolism (drug). The physical and chemical processes by which substances taken into the body are broken down or transformed into forms in which they are used or excreted.

Metabolite. A secondary compound derived from a primary substance by the process of *metabolism*.

MMPI (*Minnesota Multiphasic Personality Inventory*). A personality test consisting of a series of statements which an individual categorizes as true or false when applied to himself. Scores may be presented as a profile of nine personality factors.

Mode. One of several measures commonly used to represent a typical observation in a set of observations. It is the most frequently occurring score in the set. (Compare *average*, *mean*, *median*.)

Narcotic. This term has had wide and inconsistent usage in lay, legal and scientific circles. Some use the word to characterize any drug which produces stupor, insensibility or sleep; many apply it only to derivatives of the opium plant; others consider the term equivalent to “addiction-producing”; and in legal matters, ‘narcotics’ may refer to almost any allegedly dangerous drugs. (Compare *opiate narcotics*.)

Neurology. The scientific study of the structure and function of the nervous system.

Neurosis. An ill-defined psychological disorder, generally, but, not always, less severe or incapacitating than *psychosis*. Various manifestations of anxiety are common symptoms.

Non-Medical Use of Drugs. Use of drugs which is not indicated or justified for generally accepted medical reasons, whether or not under medical supervision.

Opiate Narcotics. The pharmacologically active alkaloids typical of the opium poppy, *papaver somniferum*, the semisynthetic derivatives of these alkaloids, and the wholly synthetic substances with similar pharmacological properties. Examples of these are morphine, heroin and Demerol®, respectively. Opiate narcotics are used medically primarily for their pain-relieving effects. These drugs are also sometimes called opiates (Compare *opium*, *heroin*, *narcotics*.)

Opium. The dried juice from the unripe seed pod of the poppy (*papaver somniferum*) obtained soon after the petals begin to fall. Morphine, codeine and other active alkaloids can be extracted from the exudate. (Compare *opiate narcotics*, *heroin*.)

Overdose (drug). A quantity or *dose* of a drug larger than that desired or normally taken. Usually implies some adverse or toxic reaction. (Compare *poison*, *toxic*.)

Paranoia. A condition usually characterized by *delusions* of persecution and/or grandeur. In severe instances paranoia may be considered a sign of *psychosis* (e.g., paranoid *schizophrenia*).

Participant Observation. A method of behavioural observation in which an investigator participates, in varying degrees, as a member of the group he is studying. (Compare *phenomenology*.)

Pathology. A diseased or abnormal condition.

Perception. The processes whereby sensory information is organized, resulting in an awareness of objects or events.

Pharmacology. The scientific study of the effects of drugs on the living organism.

Phenomenology. A method of knowing based on intuition and subjective feelings. A phenomenologist attempts to understand people by immersing himself in their social world and entering into their manner of perceiving their environment.

Physical Dependence. A physiological state of adaptation to continuous use of a drug (normally occurring after the development of *tolerance*) which results in a characteristic set of acute physiological *withdrawal symptoms* (often called the *abstinence syndrome*) when administration of the drug is stopped.

Physiology. The scientific study of physical function in the living organism.

Placebo. A substance without relevant pharmacological activity which is given to an experimental subject (in a control condition) to determine and control for the influence of his motivation, expectations, etc. The subject is not informed of the true nature of the placebo substance. A placebo effect is a reaction entirely due to the subject's *set* and *setting* rather than to any pharmacological properties of the substance. (See also *double blind*, *single blind*.)

Poison. Any drug in a quantity which exceeds the amount which the body can tolerate without damage or injury. Any drug can be poisonous if the dose is sufficiently high. (Compare *toxic*.)

Population. The total number of cases (e.g., individuals, residents, households, events) with a given set of characteristics.

Predisposition. A condition or factor which is favourable to, or results in a greater likelihood of, the occurrence of some other phenomenon. A predisposing factor, alone, is not sufficient as a cause.

Premorbid. Referring to conditions existing prior to the development of some disorder or disease.

Prospective Study. A study designed, in advance, to examine the developments or changes in certain variables in a population over time.

Psychedelic. Mind-manifesting or consciousness-expanding; introducing new or dramatically altered *perceptions* into the conscious mind. (Compare *psychedelic-hallucinogenic drugs*.)

Psychedelic-Hallucinogenic Drugs. This group includes drugs often described as *psychedelic* (mind-manifesting), *hallucinogenic* (hallucination-producing), *psychotomimetic* (psychosis-imitating), *illuminogenic* (illusion-producing) and *psychodysleptic* (mind-disrupting). While these terms refer to somewhat overlapping effects alleged to occur with these drugs, the various labels emphasize different characteristics. Probably none are entirely adequate as descriptive terms. These drugs produce profound alteration in sensation, mood and consciousness at doses which result in comparatively slight general physiological activity. LSD is often considered the prototype for this drug class. Cannabis is sometimes classified in this group, although others object to this categorization.

Psychiatry. A medical specialty dealing with the prevention, diagnosis and treatment of problems of psychological adjustment. (Compare *psychology*.)

Psychoactive. See *psychotropic*.

Psychological (or Psychic) Dependence. A condition in which a person depends upon something (e.g., a drug) for satisfaction or a feeling of well being. Psychological dependence on a drug may vary in intensity from a mild preference to a strong craving or compulsion to use the drug. In severe cases, unpleasant psychological or behavioural symptoms may result if

regular administration of the drug is stopped. A satisfactory operational definition of the concept of psychological dependence is difficult to achieve. Some aspects of this condition are also called *behavioural dependence*. (Compare *physical dependence*, *habituation*.)

Psychology. The scientific study of behaviour and the mind.

Psychometric. Based on psychological questionnaires or tests.

Psychomotor Performance. Behaviour associated with the integration and co-ordination of certain sensory, psychological and muscular functions. Psychomotor tests usually measure such things as muscular co-ordination, behavioural skills, and response speed.

Psychopharmacology. The scientific study of the effects of drugs on psychological and behavioural activity.

Psychosis (or Psychotic). An ambiguous term with a variety of meanings. It has often been used to refer to any severe mental or behavioural disorder, although more specific applications usually imply the presence of *delusions* or *hallucinations* and a general inability to test or evaluate external 'reality'. There is often considerable disagreement among authorities as to what exactly constitutes a psychotic state; the diagnosis is often highly subjective and may vary greatly among observers.

Psychotomimetic Drug. A drug which produces psychological effects which resemble, in some respects, the symptoms of *psychosis*. (Compare *psychedelic-hallucinogenic drugs*.)

Psychotropic (or Psychoactive) Drugs. Those drugs which alter sensation, mood, consciousness or other psychological or behavioural functions.

Pursuit Tracking. A *psychomotor tracking* test in which the subject is presented with two indicators—a moving stimulus which represents the desired output and another which is under the subject's control. The objective is to manipulate the apparatus to cause the two indicators to coincide.

Reaction Time. The time interval between the presentation of a stimulus and the subject's response to that stimulus. (See also *choice reaction time*.)

Reinforcement. The strengthening of a learned response. Often used synonymously with reward, although this usage is not always appropriate.

Reliability (test). The ability of a test to give consistent results. Although a test must be reliable to be valid, reliability does not necessarily imply test validity.

Response. A reaction elicited by stimulation.

Reverse-tolerance. See *sensitization*.

Sample. A limited number of cases selected from, and usually thought of as being representative of, a particular *population*.

Schizophrenia. A group of naturally occurring *psychotic* disorders generally becoming manifest in late adolescence or early adulthood. The term is often considered synonymous with *dementia praecox*. Contrary to popular belief, schizophrenia does not refer to 'split-' or 'dual-personality'. (Compare *psychosis*.)

Sedative. A drug which reduces activity and arousal, and facilitates sleep.

Sensitization. A condition in which the response to a certain dose of a drug increases with repeated use. In the cannabis literature this phenomenon is often called "reverse-tolerance". Under some conditions the use of one drug may sensitize an individual to the subsequent use of a different drug as well. (Compare *tolerance*.)

Set. The psychological state or disposition of an individual, including his expectations, motivations and attitudes, which may affect his drug experience. (Compare *setting*.)

Setting. The circumstances or environment in which a drug experience occurs which may be a significant factor in determining the drug's effects. (Compare *set*.)

Signal Detection. The process whereby stimuli with relevant information are distinguished from extraneous stimuli. Certain statistical techniques allow evaluation of the subject's sensory functioning and the criteria he uses in making judgements.

Single Blind. An experimental procedure in which the subject does not know which particular treatment (e.g., the identity or dose of a drug, or a *placebo*) is being given. This procedure is designed to minimize the influence of the subject's *set* and *setting* on the experimental variables. The researcher is aware of treatment conditions at the time of the test, however. (Compare *double blind*.)

Skin Conductance. The electrical conductance of the skin (usually on the palmar surface of the fingers or hands). This measure is determined primarily by sweat-gland activity and is commonly used as an index of arousal or emotionality. Phasic and tonic factors are often distinguished. The reciprocal of conductance (resistance) may be measured directly. These variables are often called the Galvanic Skin Response (GSR).

Socio-demography. The statistical study of social variables such as age, sex, religion, income, occupation, education and ethnic background.

Somatic. Pertaining to the body.

Speed. A common 'street' name for *amphetamines* (primarily Methedrine®) and, sometimes, certain other *stimulant* drugs. 'Diet pills' and 'pep pills' may be termed speed.

Spiral After-effect. The distortion of visual perception which follows a period of viewing a rotating spiral.

Statistically Significant. A measurement or score which is statistically highly unlikely to have occurred by chance alone and might therefore be attributed to some specific non-random factor such as an experimental treatment or selection variable.

Stimulant. A drug which increases physiological or psychological activity and arousal.

Stimulus. Energy which acts upon an organism to produce a reaction.

Stratified Sample. A *sample* which is selected by dividing a *population* into categories based on certain relevant variables and then sampling a certain number of cases from each category.

- Structure-Activity Relationship.** The degree to which the effects or actions of a drug are related to different aspects of its chemical structure.
- Survey.** A study of the incidence of certain conditions in a particular population, which optimally employs standardized techniques to collect information. Often only a representative *sample* from the population is studied directly.
- Syndrome.** A set of symptoms or behaviour patterns which characteristically occur together in certain conditions.
- Synesthesia.** A condition in which a *perception* characteristically associated with one sensory mode is experienced in another sensory mode as well (e.g., 'hearing colours').
- TAT (Thematic Apperception Test).** A personality test in which the subject makes up a story about each of a series of pictures. The analysis of the story is intended to provide information about the subject's personality.
- Teratogenic.** Producing physical defects or abnormalities in the offspring (foetus) during pregnancy.
- Tetrahydrocannabinol (THC).** One of the major groups of *cannabinoids*. Delta-9 THC is considered to be the principal active constituent (perhaps via *metabolites*) in natural cannabis preparations. A second active isomer, Δ^8 THC, is less often present in marijuana or hashish and typically occurs in minute amounts. THC may appear in neutral or carboxylic acid forms (THCA).
- Time Estimation.** A procedure for measuring subjective time whereby the subject is required to judge the duration of a given interval without the aid of external timing mechanisms.
- Time Production.** A procedure for measuring subjective time whereby the subject attempts to produce a given time interval without the aid of external timing mechanisms.
- Time-Response Relationship.** The relationship between the elapsed time since a drug was administered and the intensity of its effects. (Compare *dose-response*.)
- Titrate.** To regulate a dose by stopping drug administration when the desired intensity of drug effect is achieved.
- Tolerance.** A condition in which certain aspects of the response to a dose of a drug decrease with repeated use.
- Toxic.** A damaging or disrupting drug effect (often used to describe symptoms of poisoning). All drugs have toxic effects if the dose is high enough. (Compare *poison*.)
- Tracking.** A *psychomotor* task involving intermittent or continuous manipulation of an instrument or machine in an attempt to follow a stimulus or maintain a given level of output.
- Tranquilizer.** A general term for a number of often chemically unrelated drugs used for their calming effects. Major tranquilizers are used primarily for reducing symptoms of psychosis and minor tranquilizers are typically employed to relieve anxiety and tension, and to facilitate sleep. Only the latter drugs are commonly used non-medically.

Two-Flash Fusion Threshold. The shortest time interval between two brief light flashes at which they are seen as separate from one another. Often employed as a measure of cortical arousal.

Validity (test). The ability of a test to measure what it is intended to measure.

Visual Acuity. The ability to perceive small spaces between objects in the visual field. The smaller the space that can be distinguished, the greater the acuity.

Visual Imagery. Visual impressions perceived in the absence of external stimuli. Often tested with eyes closed and/or in darkness.

Withdrawal Syndrome (or Symptoms). A characteristic set of acute adverse physiological and psychological symptoms which occur, after the development of *physical dependence*, when the regular administration of the drug is stopped (or its effect inhibited by an *antagonist*). Also called the *abstinence syndrome*. The characteristics of withdrawal vary with different drugs and with different patterns of use.

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Index

Only those names which appear in the text have been indexed. The index does not include the Glossary or the Appendices, nor does it include names which appear only in the References and Selected Bibliographies. The relation of one aspect of cannabis to another is shown by using the second as a subheading under the first. Thus in many cases, the subheadings also appear as index entries. Since the subject of this report is cannabis, most of the entries deal with some aspect of the drug. Only material specific to a particular form of cannabis appears under the name of the form.

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